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Mining Coal in Southern Colorado

The Carbon Coal and Coke Company Is Operating a Model Plant at Cokedale. Advanced Systems of Sprinkling and Short Firing in Use

BY KENNETH S. GUITERMAN*

The coking-coal producing measures of Colorado are located principally in the Spanish-Peaks quadrangle. This quadrangle occupies the territory bounded by the meridians 104 deg. 30 min. and 105 deg., and by the parallels 37 deg. and 37 deg. 30 min., and with the exception of 28 square miles in Huerfano county, lies in Las Animas county. Of the 950 square miles comprising this quadrangle, 495 square miles contain coal measures of industrial importance. The seams which are worked by the Carbon Coal & Coke Company are situated in Reilly cañon. This cañon is about seven miles southwest of Trinidad.

FIG. 1. COKE OVENS AND SURFACE PLANT OF THE CARBON COAL AND COKE COMPANY IN COLORADO

Geology

The main facts in the following geological description have been taken from the "Geological Folio of the Spanish-Peaks Quadrangle." The coal-bearing measures of this quadrangle of economic importance lie between the Trinidad sandstone and the Laramie series of the upper Cretaceous period. The Trinidad formation consists of a basal zone of thin-bedded, fine-grained sandstone separated by thinner partings of shale varying from 3 in. in thickness to 4 or 5 ft. at the base. This lower zone has a thickness of from 70 to 75 ft. in the vicinity of Trinidad, but shows about 90 ft. at the northern boundary.

The upper zone consists of 80 ft. of massive, light gray sandstone, capped by a few feet of brown sandstone. The Laramie series lie above this for a variable thickness. Along the southwest border of the quadrangle nearest the Baton mountains, it is 2000 ft. thick. This thickness, however, is much less in the northern portion, becoming about 1500 ft. at the boundary.

The coal from which the present output is derived in the Spanish-Peaks quadrangle lies within 150 ft. of the base of the Laramie. The seams throughout this series number no fewer than 30, but most of them are only 3 to 12 in. thick and lack continuity. These are, therefore, of little economic value. One of the accompanying figures shows a representative drill-hole section of the formation on the Carbon Coal and Coke Company's property in their present workings. The seams lie with very little dip, the maximum being along the outcrop, where it varies from 3 to 7 degrees.

Owing to the volcanic nature of the country, considerable natural coke is found, this being noticeable along the sides of Reilly cañon where a large portion of the outcrop is natural coke. This crop coal and natural coke is, however, much weathered and dirty and of no value.

The coal in the south of the quadrangle is highly coking in contradistinction to that in the northern portion, which is only semi-coking. Like other coals in this vicinity, however, it contains two or three streaks of bone and needs washing prior to treatment in the coke ovens. It is noted for the perfection of its faces and the ease with which it breaks in large rectangular blocks.

The average composition of the coal on the Carbon Coal and Coke Company's property as mined is as follows: Fixed carbon, 47; volatile matter, 27.5; moisture, 1.5; ash, 23.

The coke made from the washed material from this coal carries 18.5 per cent. ash, and has the high specific gravity of 1.10 to 1.15.

The plant of the Carbon Coal and Coke Company is admirably situated for the rapid and economic mining of the coal and the production of coke. The mine itself is far above water level, which renders extensive pumping machinery and hoisting apparatus unnecessary.

Mining

The method of mining that is practised here is what is known as the double-entry, room-and-pillar system, with robbing on

retreat. Double entries are driven from the crop to facilitate ventilation and haulage. The main entries run north and south and are face entries, owing to the fact that they are driven across the faces of the coal. As far as possible no rooms are opened from these entries as butt rooms offer greater difficulty to the rapid and economical removal of the coal than face rooms. In driving the entries, crosscuts are located every 100 ft., in order to provide ample ventilation for the men. These crosscuts are gobbed up as the entry work proceeds further and new ones are driven. By so doing, a current of air is always passing up one entry and down another. From the north and south entries, the east and west entries are driven, and from these latter rooms are turned off at 45-ft. centers. The room necks are 10 ft. wide and the rooms 20 ft. Crosscuts are driven between adjoining rooms as the work proceeds for the purpose of ventilation.

FIG. 2. SHOWING TOWN OF COKEDALE, COMPANY STORE AND OFFICE BUILDING. THIS VIEW IS A CONTINUATION OF THE PHOTOGRAPH SHOWN IN FIG. 1

High Recovery of Coal

While the rooms are being opened from one east-and-west entry, others are opened from an adjacent entry, so that the two sets of rooms meet in the center. When this has been accomplished, the work of retreating is commenced and the pillars are robbed, letting the roof cave in as the work progresses. The result of this rational system is that over 90 per cent. of the coal is recovered in mining.

As the coal is mined it is hauled by mules in pit cars to what is known as the "main parting." Here the cars are left until at least 40 have accumulated. The cars are then attached to the main rope of the rope haul and the entire trip is brought to the slope bottom. The empties, which in the meantime have accumulated here, are now attached to the tail rope and hauled back to the "main parting." Mule teams distribute them from here to the various rooms. For this work there are 13 drivers employed, each of whom handles from 6 to 12 cars, depending upon the length of the pull. Each trip to and from the rooms consists of three cars which are distributed one car at a time to each room. By this system one driver will handle the coal mined by about 18 to 20 men, and will average about 100 tons per day.

The ventilation of the mine is accomplished by a double-inlet, reversible Clifford-Capell fan 15x7 ft. direct connected to an Erie engine 19x18 in., placed at the end of the first north entry just west of the boiler house. This fan has a rated capacity of 225,000 cu.ft. per min, against 4½-in. water-gage pressure at 175 r.p.m.; this system provides a splendid circulation of air throughout the entire mine.

Special Inspectors are Employed

The workings are remarkably free from gas as well as dust, but nevertheless the greatest precautions are taken to prevent accidents. By 6 o'clock every morning, before any miners are permitted to enter the mine, the fire-boss has made a thorough inspection with a safety lamp and then reports to the mine foreman concerning the conditions that he found on making his tour. Should any gassy places be found no miners are allowed to work there until the gas has been thoroughly removed. A particular feature covering the safety of the coal mines at this property is the employment of two inspectors, whose sole duty it is to cover the mine continually during working hours and inspect working conditions in rooms and entries and pass on the state of the roof and walls. No miners are allowed to work in dangerous places nor are they permitted to do anything which can possibly endanger the safety of others.

In the near future an electric shot-firing system and also a sprinkling system will be installed. A plan of the former proposed systems is shown on the accompanying drawing. At present all shots are fired by hand. For this purpose there are employed four shot-firers and four helpers. These men enter the mine about 6 o'clock p.m. after the miners have left, and start loading the drill holes which have been bored by the miners during the day. The powder, etc., used is charged to the miners who have drilled the holes. On leaving the rooms, where they have been working, the miners mark up on a board their respective check numbers as well as the number of holes they desire to be loaded. The shot-firers alone handle the powder and at all times are the judges as to whether the holes shall be charged or not and how they shall be loaded. When all the holes in one room have been charged, the firers go on to the next room, at the same time lighting the fuses. They are thus able to judge as to whether all the shots have been fired and of the effects of the shots. In this way, all shots are fired. These often number as many as 175 in a night. During the firing no other men are allowed in the mine.

As there is not much water in the mine no extensive pumping plant is required. There is, however, one main pump having a capacity of 80 to 90 gal. per min. which draws water from one large collecting sump. This pump is electrically driven and will be used in conjunction with another for the sprinkling system to be installed later on.

The Method of Checking

The method of checking in the men is a most thorough and comprehensive one. All men enter and leave the mine through the check house. As each man is employed, he has issued to him a special

check number. This is done from the main office. He is then given a brass check with his number and he is supposed to keep this with him at all times while in the mine. At the check house there is kept a description of the man. When the miner is out of the mine his brass check is kept hanging over this identification card. When the man reports for work in the morning he passes through the check house and is given a brass check, which he must return to the check-house keeper on leaving the mine. He then goes to another check board at the mine mouth and takes from it ten iron checks having his number stamped on them. Each of these iron checks he places in a car of coal as he loads it. When this coal is weighed at the tipple the weighmaster secures the check from the car and at once

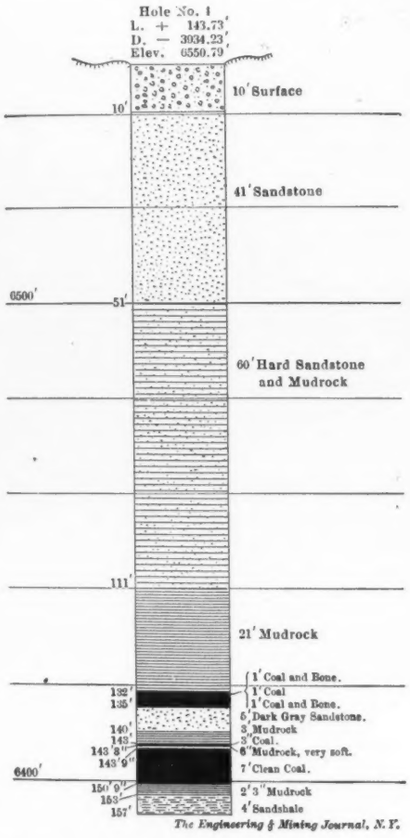

FIG. 3. SECTION THROUGH COAL MEASURES

marks up the net weight of the coal under the man's check number on the weigh sheet. In the evening the weighmaster returns to the checkmaster all the iron checks together with a carbon copy of the weigh sheet. This sheet is posted on a board outside of the check house for the men's inspection and the checks are returned to the check board. The number of checks for each number should correspond to the number of cars of coal mined by the man having that number. This gives a check on the weighmaster's report.

A careful record is kept of all supplies, timber, etc., taken into the mine and a charge is made against each man taking them in. The failure of any miner to properly timber a dangerous place pointed out by an inspector or the foreman means dismissal or suspension for a time.

An emergency room is located in the mine and is well equipped for accidents. This room is connected with other parts of the plant by telephone.

As the coal lies very nearly horizontal throughout the mine, there are few steep pitches. Nevertheless the greatest care is used to obtain the most suitable grades for hauling, the maximum being 1.20 per cent. at any portion of the main haulage ways.

The giant powder, caps, etc., are stored in two magazines located on the hillside. The main magazine is used only for a storehouse. From this the supply for the smaller magazine is obtained. In the latter the powder is thawed in cold weather by an electric heater and it is from this magazine that it is taken into the mine. Both large and small magazines are built entirely of stone, cement and iron, rendering them absolutely fireproof.

The labor distribution of the mine is shown by an accompanying diagram. There are constantly employed one track-layer and helper, one timberman and helper and two to three gangs of laborers under local foremen. The mining and entry work are carried on under contract system, that is, by fixed payment for coal tonnage and yardage.

Coal Washing Plant

The coal-washing plant is one of the simplest and best of its kind in the West and gives most satisfactory results. The accompanying drawing gives an idea of its construction.

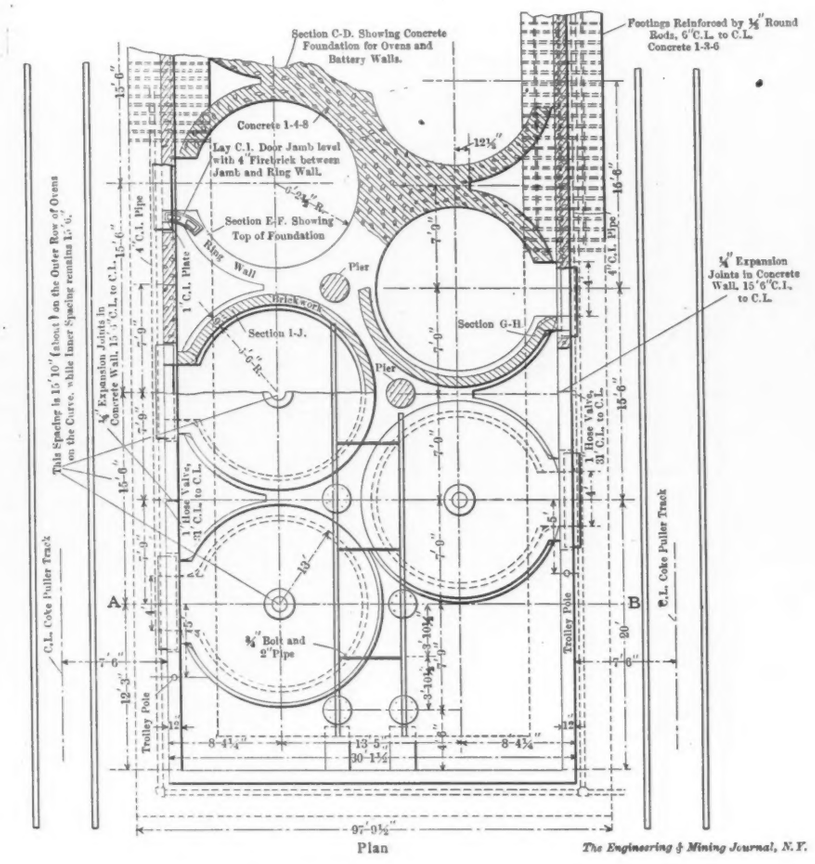
Section C-D. Showing Concrete Foundation for Ovens and Battery Walls.
Footings Reinforced by ½" Round Rods, 6" C.L. to C.L. Concrete 1-3-6
Concrete 1-4-8
Lay C.I. Door Jamb level with 4" Firebrick between Jamb and Ring Wall.
Section E-F. Showing Top of Foundation
Ring Wall
Pier
Brick Arch
Section I-J.
Section G-H
¾" Expansion Joints in Concrete Wall, 15'6" C.L. to C.L.
¾" Expansion Joints in Concrete Wall, 15'10" C.L. to C.L.
This Spacing is 15'10" (about) on the Outer Row of Ovens on the Curve, while Inner Spacing remains 15'0".
1" Hose Valve, 31 C.L. to C.L.
C.L. Coke Puller Track
E.L. Coke Puller Track
Trolley Pole
¾" Bolt and 2" Pipe
A
B
C
97'-9½"
Plan
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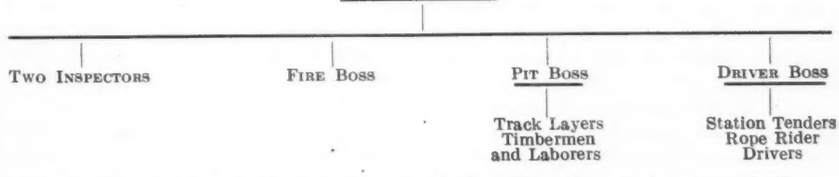
FIG. 4. PLAN SHOWING ARRANGEMENT AND CONSTRUCTION OF COKE OVENS

From the slope mouth the loaded cars are hauled by means of a chain-haul to the tipple. Here the car is automatically released from the chain-haul and rolls down a slight incline toward the dumping device. While on this incline the car first

DIAGRAM SHOWING LABOR DISTRIBUTION



passes through a braking device so that the velocity of the car is reduced sufficiently to allow of its being automatically weighed. The scale is of the Fairbanks self-registering dial type and is placed immediately after the braking device. The cars have a net weight of 2000 lb. and the scale is previously counterbalanced for this weight. As each car passes over the platform the dial registers the net weight of the coal. This weight is recorded by the weighmaster as has been already mentioned.

The car then runs on to a crossover dump and is stopped before reaching the end by a boy with a sprag. The coal is then dumped and the iron check removed from the car. This check is tossed to the weighmaster for registration. After the car has been dumped, it rests until the next car runs into it and pushes it along.

The empty car then runs down an incline and is automatically switched to another incline running in the opposite direction. This can be clearly seen in plate No. 9. At the lower end of this incline is a gripping device which holds the car until it is caught by the chain haul by which it is taken again to the slope mouth.

At the dump is stationed an inspector or tipple-boss who informs the weighmaster if the car is in bad order. The dumper controls the chain-haul and is notified by the ringing of an electric bell should it become necessary for any cause to stop the haul.

From the cars the coal drops into a bin having a capacity of 50 tons. This bin has a gate and star feed at the bottom which feeds into a Jeffrey crusher. This reduces the size to about 2½ in. in diameter. Falling from this crusher the coal drops to the boot of a continuous bucket elevator. This carries the coal to the top of the building where it is first discharged to a scraper conveyer and then by means of hand gates drops into storage bins. These bins have a capacity of about 1200 tons. From these bins the coal is now fed to a Robbins belt conveyer through hand gates. This conveyer delivers the coal to a cutter operated by hand and by means of which a sample is cut out. A portion of the entire coal stream is cut out here every 10 min. for the sample. During periods of intermission the coal drops through a chute to a grizzly. All the coal of ¾-in. size or under drops through this grizzly, while the oversize drops through a chute to a pair of rolls set at 1-in. aperture. After passing through these rolls the coal unites with that which passes through the grizzly in a bin directly underneath. The sample is quartered down at the end of the day's run to about 50 lb. and is then taken to the laboratory for analysis.

From the crushed coal bin the coal passes through three gates and star feeds into three modified Pittsburg jigs. These jigs operate on a 3-in. stroke, and at a speed of 24 per minute. The jigs separate the coal into two products: (1) headings; (2) tailings.

The headings from the jigs Nos. 1 and 2 pass to a screw conveyer which delivers the washed slack to the boot of a bucket conveyer. The buckets of this elevator have perforations to allow as much water as possible to drain out. This is elevator No. 1. The headings from jig No. 3 pass at once to the boot of a similar elevator, No. 2.

Both of these elevators deliver the washed slack to a scraper conveyer. This conveyer distributes the coal with the aid of hand gates into the five compartments of the washed slack bin.

The tailings from these jigs pass through a slate gate and to another screw conveyer which delivers them to a bin behind jig No. 4, which is known as the primary rewash jig. The quantity of tailings passing through the slate gate is so regulated by hand as to maintain a bed of 8-in. thickness. To aid the jig tender in accomplishing this, the jigs are provided with indicators of local design and with gates of special construction.

Returning again to the tailings deposited in the bin behind jig No. 4. These tailings pass through a gate and feed this jig. The jig has 24 six-inch strokes per minute. This jig likewise separates the coal into two products, heads and tailings.

The headings wash over and to a plate and by means of a short scraper elevator are delivered to jig No. 5. The tailings, which are rock, pass out through a hopper and into the boot of the refuse

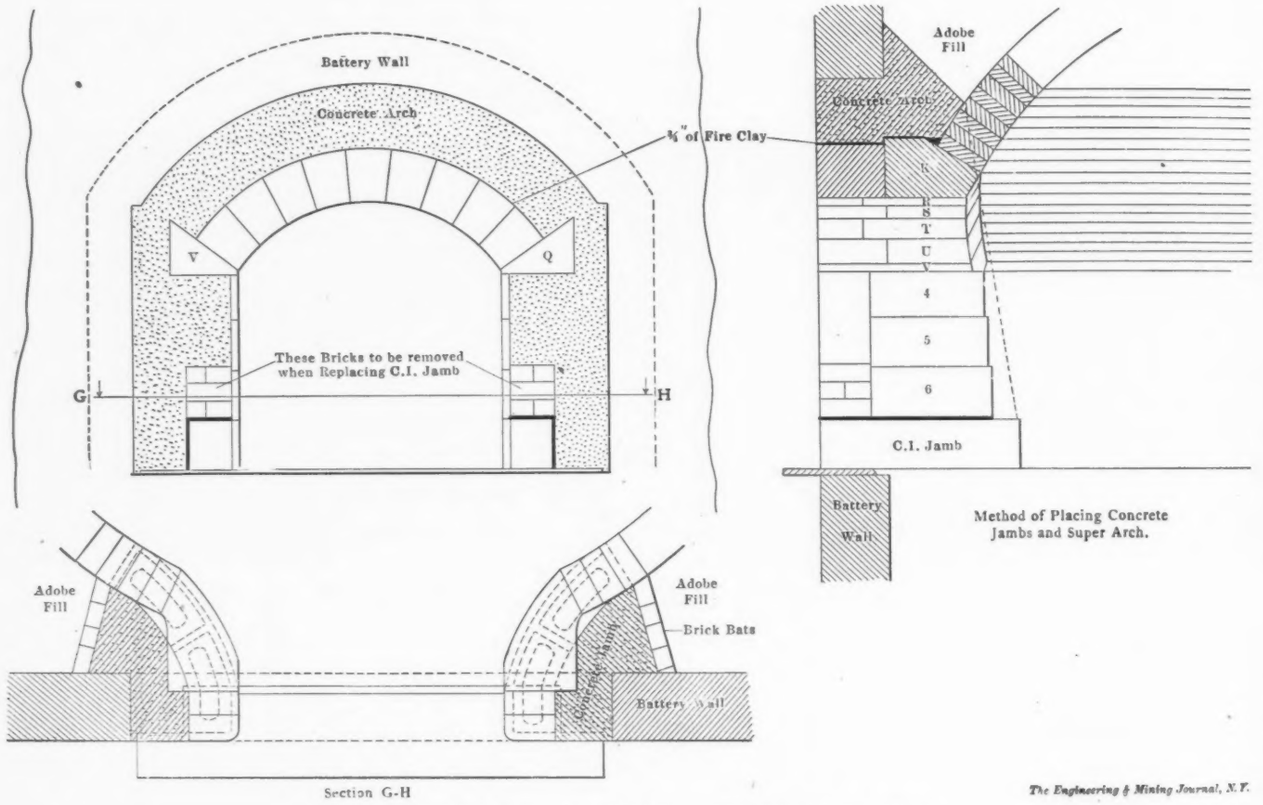


FIG. 5. SECTIONAL VIEWS SHOWING COKE OVEN CONSTRUCTION

elevator. This elevator likewise has perforations for the purpose of draining off as much water as possible. It delivers the rock to the refuse bin of 50 tons capacity.

Jig. No. 5 , having twenty 6-in. strokes per minute, divides the coal again into two portions known respectively as heads and tailings. The headings pass into the boot of a bucket elevator and unite with the washed slack from elevators Nos. 1 and 2 on the scraper conveyer above. The middlings fall into the boot of the middlings elevator and are delivered to a grizzly overhead. All coal over ¾ in. passes over this grizzly and into a 25-ton bin from which it is drawn for boiler use.

The undersize passes through the grizzly and into the refuse bin before mentioned. It is separated by a partition from the rock bin. A scoop sample is taken from each elevator every 20 min., and at the end of a day's run all like samples are united and quartered to a convenient size and taken to the laboratory. One reserve is always kept from each quartering in case of accident.

The washed-slack bin has a capacity of 1200 tons and is for the purpose of storage and drainage. The moisture is reduced here from 18 to 20 per cent. to 9 to 10 per cent. There is at present an additional bin in the process of construction, which, when completed, will allow the slack a still longer time to drain, with consequential further reduction of moisture content.

The refuse bin has a capacity of 50 tons, and is emptied by two hand gates, one for the rock and one for the middlings. The refuse is drawn alternately from each of these gates into buckets holding 800 lb. Two men are employed for this purpose, each using one gate. Each man keeps a careful tally of the buckets filled. The buckets are also counted twice by automatic counters before leaving the loading platform. In this manner an exact record is kept of the total number of buckets removed, and the quantity of each material is computed therefrom. These buckets are taken by an aërial tram to the refuse pile at some distance away, where they are automatically dumped.

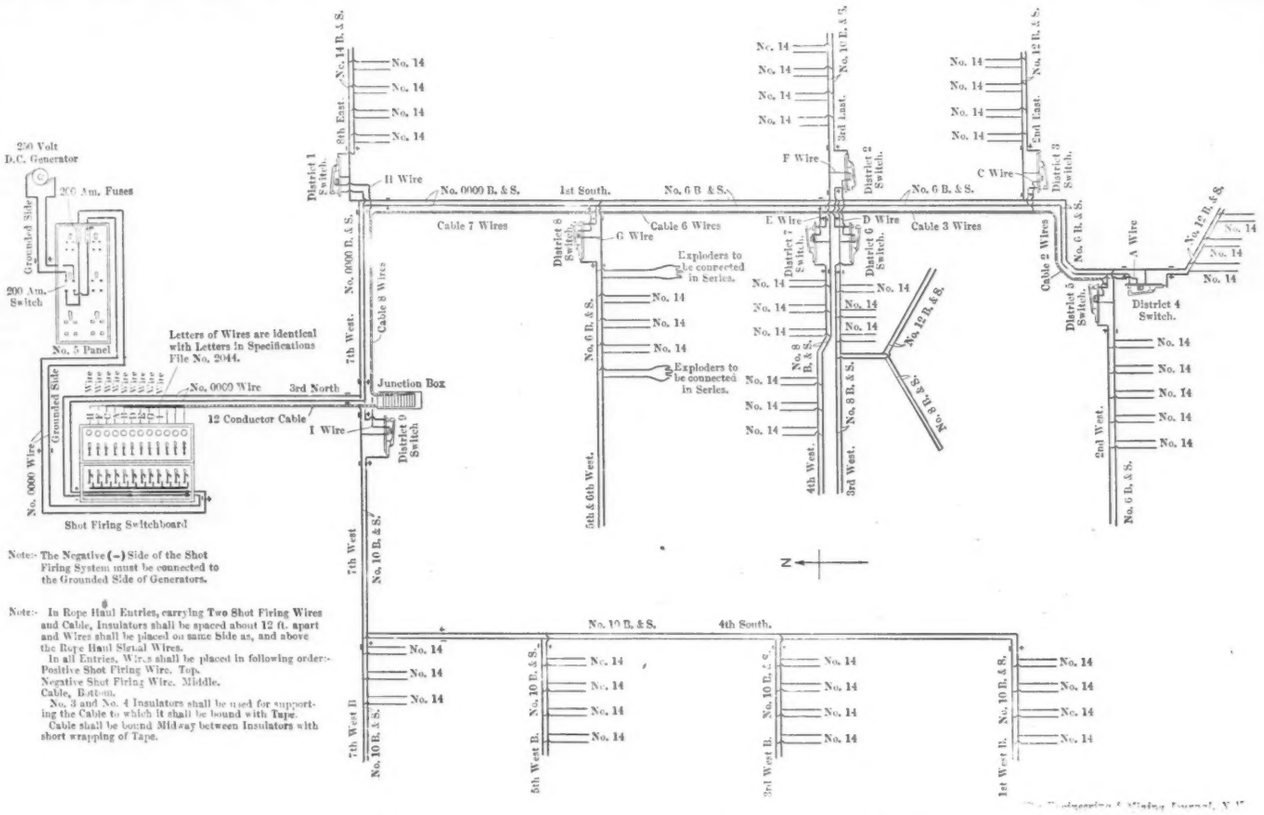

250 Volt D.C. Generator
200 Am. Fuses
Grounded Side
200 Am. Switch
No. 5 Panel
Letters of Wires are identical with Letters in Specifications File No. 2044.
No. 0000 Wire
3rd North
Junction Box
12 Conductor Cable
I Wire
District 9 Switch
Shot Firing Switchboard
Note:- The Negative (-) Side of the Shot Firing System must be connected to the Grounded Side of Generators.
Note:- In Rope Haul Entries, carrying Two Shot Firing Wires and Cable, Insulators shall be spaced about 12 ft. apart and Wires shall be placed on same Side as, and above the Rope Haul Signal Wires.
In all Entries, Wires shall be placed in following order:-
Positive Shot Firing Wire. Top.
Negative Shot Firing Wire. Middle.
Cable, Bottom.
No. 3 and No. 4 Insulators shall be used for supporting the Cable to which it shall be bound with Tape.
Cable shall be bound Midway between Insulators with short wrapping of Tape.
No. 14 B. & S.
9th East.
No. 14
H Wire
No. 0000 B. & S.
1st South.
No. 6 B. & S.
Cable 7 Wires
Cable 6 Wires
Cable 3 Wires
Cable 2 Wires
Cable 8 Wires
7th West.
6th & 6th West.
4th West.
3rd West.
2nd West.
No. 10 B. & S.
4th South.
5th West B.
3rd West B.
1st West B.
F Wire
C Wire
E Wire
D Wire
G Wire
A Wire
Exploders to be connected in Series.
No. 8 B. & S.
No. 12 B. & S.
No. 6 B. & S.
District 1 Switch.
District 2 Switch.
District 3 Switch.
District 4 Switch.
District 5 Switch.
District 6 Switch.
District 7 Switch.
District 8 Switch.
3rd East.
2nd East.
N

FIG. 6. SHOWING SHOT-FIRING SYSTEM AT THE COKEDALE PLANT

Coke Ovens

The washed slack is drawn from the bin into electric larries by means of hand gates, 22 in number. These gates differ from others heretofore mentioned in having hollow frames. In winter, steam passes through these and prevents the gates from freezing.

One of the larries, known as the "head larry," has a partition which divides the load in half. This makes it possible for the whole or only half of the load to be dumped at a time as conditions require. The head larry has an average weight of about 12,500 lb., and has a capacity of 11 tons. The other larries weigh about 12,950 lb. and can carry about 13 tons.

The washed slack is drawn in such a manner as to allow it 20 hours to drain. This is accomplished by drawing from only one section of the bin at a time.

The larries pass over a Fairbanks scale before reaching the ovens and the total weight is recorded by the larryman. After dumping, the larry again passes over the scale on its return, and the tare weight is recorded. After this is once done the tare is checked up again every five or six loads by the foreman. While dumping, the larryman takes a scoop sample of the slack amounting to about 1½ quarts. This sample is thrown in a sample bin and then removed from time to time to the laboratory for analysis when the charging is done.

There are two batteries of ovens in all; one consisting of 190 ovens, and the other of 160 ovens. Of these only 290 are in operation at present.

The construction of these ovens shows a radical departure from the usual style, but this has proved extremely satisfactory in every way. All are beehive ovens having a floor diameter of 13 ft. The battery walls, instead of being built of stone, are of reinforced concrete. These walls have not only great stability, but have the advantage over stone in not allowing air leakage. The novel construction of the door arches is also worthy of note. Heretofore it has been the custom to construct

both the main and superarch of the oven doors of fireclay tile leaving small expansion spaces between the two arches and between the upper arch and the battery wall proper. This has the great disadvantage that neither arch has enough weight upon it to hold the arch firmly in place. When expansion takes place after the ovens are fired, the result is that these arches soon bulge and if not repaired soon, fall out. A remedy for this trouble has been found by making the superarch of concrete and allowing no expansion spaces whatever, as they have been found to be unnecessary. Since this construction has been adopted none of the arches has given any trouble whatsoever. The concrete

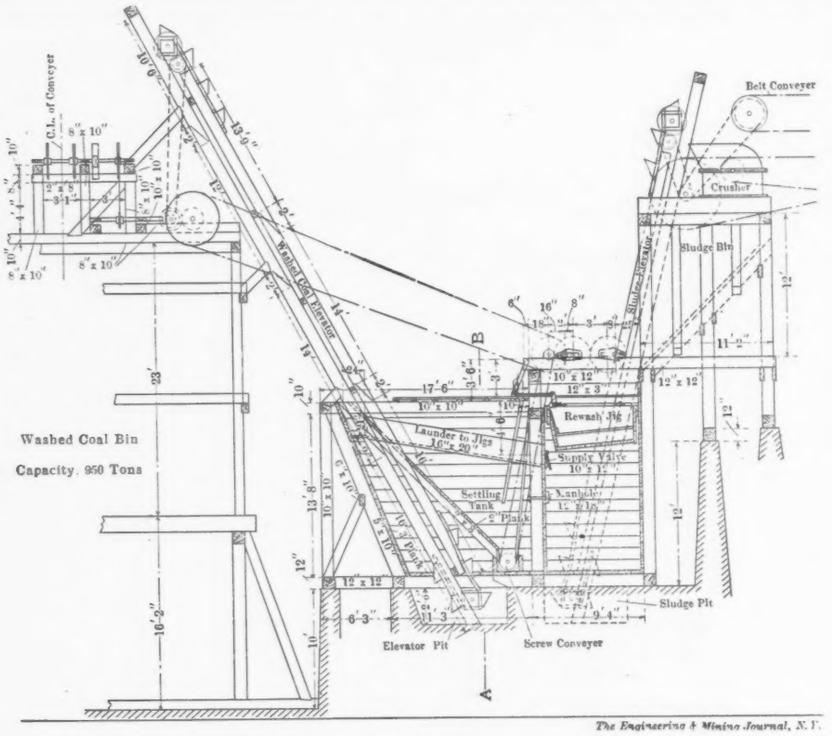


FIG. 7. SECTION THROUGH WASHERY SHOWING ARRANGEMENT OF MACHINERY

battery walls yield slightly to the expansion force, but spring back into place when the oven is put out of commission.

Another feature of interest is the use of a cast-iron jamb at the bottom of the door. These jambs were formerly made 8 in. high, but it was found that the upper portion was soon ruined by the intense heat. This led to the making of jambs only 5 in. high, which have given entire satisfaction. The accompanying illustrations show the construction of the ovens in greater detail. All outside repairs are made without shutting down the ovens at all.

Up to the present time repairs to a floor necessitated the oven being out of commission for a considerable time in order to allow it to cool so that the men could work inside. There has just been invented, however, by one of the employees, a small floor-laying machine by which floors can be laid while the oven is still hot. This machine has proved very satisfactory and is not only a labor-saving, but a time-saving device.

Each oven is charged with 13,500 lb. of slack for 48-hour coke, and with 16,000 lb. for 72-hour coke.

There are four Covington coke-drawing machines in use at the plant. Coke is drawn from alternate sides of the battery at the same time, such as the upper left and lower right. This is done in order that the temperature may not fall too far before the ovens are recharged. Coke drawing starts at about 10 p.m., so that the largest part of the work can be done while it is cool. Each of these machines pulls 48 ovens during a shift, it taking from 12 to 15 min. per oven. Scrapers follow the machines and thoroughly clean the ovens.

As soon as the drawing is over the ovens are charged again, and as soon as the charge is leveled off, the door is bricked up, and in about 1½ hours after charging the coal has started again. The watering of the coke is started about 9:30 p.m., and takes an average of about 25 min. for each oven.

The coke yield is extraordinarily high for bee-hive oven practice, being on the average a trifle over 72 per cent. This yield is figured on ingoing larry weights of slack to the ovens with attendant moisture determinations and receiving smelter weights on coke shipped. This very high yield can be attributed:

(1) To the excellent construction of the ovens which prevents air admission except through the ports for airing.

(2) To close control of airing by which wastage is prevented.

(3) To the employment of coke-drawing machinery by which the coke charge is drawn quickly and the oven recharged without loss of time and with consequential saving of heat.

(4) To the ability to use much heavier charges to the oven than would be the case in ovens of like size using manual labor for coke drawing, since by the use of coke-drawing machinery the coal has from 4 to 5 hours more time for coking in each 48 hours. As the wastage through burning is a function of surface area, the loss through the burning of fixed carbon lessens with increasing tonnage of charge.

Power Plant

The power house and boiler plant are in one building north of the washery. This building is absolutely fireproof, being made solely of steel and concrete. The boilers and engines occupy different rooms, being separated from each other by a brick partition. The equipment in the boiler room consists of the following:

Five Heine water-tube boilers of respectively 97, 106, 97, 97 and 89 h.p. under 100-lb. pressure. Besides these there are two O'Brien boilers of 80 h.p. under 100-lb. pressure. These boilers supply the necessary steam for all engines and local pumping apparatus. This does not include the pumps located at the upper and lower pumping stations.

In the engine room are the following machines: One Ball-Wood engine of cylinder dimensions 12x12 in. connected by belting to an alternating-current generator and its separate exciter; two Hamilton-Corliss engines. These have cylinder dimensions 28x48 in. and are belted to a 250-kw. direct-current generator.

The mine fan is direct connected to an Erie Engine Works slide-valve engine. This engine has cylinder dimensions 19x18 inches.

The rope haul in the mine is served by a Leyner double-drum mine hoist.

The crusher and elevator for the crushed coal are operated by an Atlas Engine Works engine having cylinder dimensions 12x18 in. A double engine of similar design, 13x18 in., supplies power for the remainder of the washery.

All the generators are placed in the engine room. The alternating-current generator, driven by the Ball-Wood engine, is a Bullock, 3-phase, 2300-volt generator, having a capacity of 74 kw. The accompanying exciter is an Allis-Chalmers direct-current 120-volt generator. This alternating-current circuit supplies current for all lighting purposes as well as for the motors driving the main water service pumps.

The General Electric Company generators, driven by the Corliss engines, each have a capacity of 150 kw. at 275 volts. This current is used for all power purposes in the plant other than those already mentioned. In the laboratory is a Westinghouse 10-h.p. motor which drives the rolls, grinders, etc. The chain haul,

of Heyl & Patterson design, has a capacity of 200 tons per hour and is operated by a Westinghouse motor of 75 h. p. This motor is in the tipple building.

The main pump, at the Townsite or upper pumping station, is gear driven by a Wagner alternating-current 10-h.p. motor. At the lower or River pumping plant, the main pumps are gear driven by two alternating-current Westinghouse 20-h.p. motors.

Pumping Plant

For the boiler feeds there are two Worthington, simple, direct-acting, duplex-piston pumps. The feed-water heater is supplied by another pump of the same type. A large fire pump of the above make, having a capacity of 700 gal. per min., is also in the power house. This pump is used only in case of emergency, as the name implies.

At the Townsite station, the main pump is an electrically-driven Rumsey & Co., single-acting, triplex, plunger pump, having a capacity of 93 gal. per min. As a relay, there is here a Davidson double-acting, steam-driven pump. These pumps deliver water direct into the service mains, all the sulplus going to reservoir No. 2 on the hill nearby. This reservoir has a capacity of 160,000 gallons.

At the main pumping plant there are two Rumsey electrically-driven triplex-plunger pumps, having a capacity of 130 gal. per min. each. These are relayed by a Worthington direct-acting, duplex-piston pump, steam driven. These pumps deliver water to the mains serving coke ovens, washery and boilers, all the surplus going to reservoir No. 1. This reservoir has a capacity of 2,800,000 gallons. The two electric pumps used here are so arranged as to make it possible for one or both to be used as occasion demands. The mains receiving this water are identical with those receiving water from the Townsite pumping plant but are separated from the latter by a gate valve. In case of accident to either pumping station this gate valve can be opened and the mains still be supplied with water.

Civic Features

At the present time there are 1286 men, women and children in the camp. Of this number 500 men are registered permanently on the pay roll. These men are employed at the mine, washery, coke ovens, etc. There are 120 houses provided for their use, ranging from three to eight rooms, the majority being from four to eight rooms. These houses represent an interesting departure from the ordinary construction. The walls are made of large, hollow, blocks of coke braize. These blocks are not only very light but have great tensile and compressive strength. The rest of the construction of the houses is in keeping with this, being solid and substantial throughout. The rent charged for these houses is nominal. Water is furnished free and electric light at a minimum rate. The houses are attractive in appearance and furnish most comfortable quarters for the employees.

For medical service a charge of $1 per month is made to each man. This entitles not only himself but likewise his family to all medical treatment and hospital care, in case of sickness or injury.

A large hall comprising the entire second story of the school house is used for all amusements. The floor is of hardwood and is kept polished for dancing. Besides this, there are stage, dressing and check rooms. The use of this hall is given free to employees.

The company has provided a large building for the purpose of a club house. This building, like the other buildings in the camp, is constructed of coke braize. It has ample furnishings in the way of billiard tables, card rooms, etc., besides a finely equipped bar. The sale of intoxicating liquors is closely regulated by company rules, and no form of gambling is permitted.

Bath House

For the convenience of the men the company has established a splendid bath-house. It is fitted with 12 showers and several enameled bath tubs. There are now 125 wire lockers for the care of clothing, etc. An additional wing is in the process of construction at present, which will still further increase the locker facilities. There is also a barber shop with a barber in constant attendance. The privileges of this bath-house are granted to all men joining the bath-house club, for which a small fee is charged. Certain afternoons are reserved for the women.

Sunday school and church services are held once a week in the schoolhouse. These services are conducted by the different Protestant churches of Trinidad. No discrimination, however, is shown toward any denomination. The Roman Catholic church has at present material on the ground for the construction of a church.

A large, exceptionally fine, schoolhouse is in the camp. It is thoroughly equipped with large class rooms on the ground floor. During the term the children are in charge of three teachers. These teachers give courses similar to those given in the grammar schools of Trinidad. A certificate from this school allows any student to enter the high schools of Trinidad without further examination. A kindergarten will soon be added. During the term there are from 125 to 150 children in constant attendance. This is entirely free.

Store privileges are leased to the Gottleib Mercantile Company. This store handles not only general merchandise but has also a splendid meat market and refrigerating plant in conjunction. The aim is to sell all goods to the employees on the same scale of prices as those obtaining in Trinidad at first-class establishments. The employees, however, are in no wise obligated to trade here. A post office with money-order department is also established in the store.

Conclusion

The enterprise of the Carbon Coal and Coke Company was inaugurated and carried out under the direction of Franklin Guiterman, president, assisted by the following able staff: F. D. Baker, chief engineer, F. P. Bayles, superintendent, and E. A. Sutton, assistant. The plant is noted for its cleanliness and its systematic operation. The yield of coke not only surpasses that of any other plant in the West but is of the highest quality physically and is splendidly adapted to the metallurgical purposes of the American Smelting and Refining Company to which it is furnished.

In concluding I wish to express my appreciation of the great kindness and courtesy accorded me by Mr. Bayles and his assistants during my visit to the camp.

Fuel Tests with Illinois Coal

"Fuel Tests with Illinois Coal," issued as circular No. 3 of the engineering experiment station of the University of Illinois, presents the results of an elaborate series of tests conducted at the fuel-testing plant of the United States Geological Survey. The circular is compiled by L. P. Breckenridge and Paul Diserens. It deals only with coals taken from mines within the State of Illinois. The investigations described include steaming tests under boilers, gas-producer tests, washing tests, coking tests, briquetting tests and tests to determine composition and heating value.

From the results stated it appears (1) that the average calorific value of Illinois coal (ash and moisture free) is 14,319 B.t.u.; (2) that its evaporative efficiency is but slightly affected by the moisture it contains; (3) that its evaporative efficiency decreases as the ash and sulphur content increases, and that when burned in a hand-fired furnace its evaporative efficiency decreases as the amount of fine coal contained in it increases; (4) the performance of Illinois coal in a gas producer compares favorably with that of any other bituminous coal tested at the laboratory of the United States Geological Survey; (5) one-fourth of all the samples tested may be used for the manufacture of coke; (6) briquetting improves the evaporative efficiency of Illinois coals only when the raw coal is in the form of slack or screenings.

Metal ties are to be preferred to wooden ones, especially for movable tracks. A simple tie is made by cutting channel iron into appropriate lengths and bolting the rail to the flat side of these by clips and bolts. Ties are usually placed 2 ft. apart; in portable tracks, 3 feet.

Ventilation System at the Comstock Mines

Mines Are the Hottest in the World; Water Temperature 160 Deg. F.; Ward Shaft Association Working at 2500 Ft.; the System Is Simple

BY GEORGE J. YOUNG*

Dr. John A. Church, in his treatise[1] on the Comstock lode, gave a full and clear account of the conditions of the mines during the period of greatest activity. The difficulties in the way of deep mining at that time were excessive water and high temperature. The drainage of the mines taxed the financial resources of the mining companies, and the high temperatures restricted the capacity of the miners for underground labor. In spite of these difficulties exploratory work was continued until the financial burden of removing the water became too great. The companies then restricted the work to the upper levels. The years 1883 to 1886 marked the period of cessation of deep mining.

For 12 years thereafter mining was confined to the levels above the Sutro tunnel; and, while the question of drainage was more or less agitated, nothing of importance was done until the formation of the Comstock Pumping Association in 1898. Since that time successive levels have been drained until, at present, on the north-end mines, a depth of 700 ft. below the Sutro tunnel level has been reached. Mining is now carried on in the Ophir mine from the 1700 to the 2200-ft. levels, and a winze is being sunk to make connection with the 2300-ft. level (the 2450 ft. of the C. & C. shaft).

In 1903 the Ward Shaft Association was formed to undertake the draining of the Central and Gold Hill group of mines, and at the present time a depth of 2500 ft. has been reached in the Ward shaft. The situation at the Ward looks promising, and the 3000-ft. level may be reached in the near future. It is proposed to establish a large pumping-station on this level, and then begin the opening of known orebodies and the prospecting for new ones.

The main factors which have contributed to the successful solution of the drainage problem are the Sutro tunnel, the use of the hydraulic elevator as a sinking-pump, the concentration of pumping-units and cheap electrical power.

The question of high temperature and its control still remains as a minor but important problem. The temperatures encountered in the new workings are as great as those in the earlier periods. The Comstock was considered the hottest group of mines in the world, and I am not aware of similar conditions in any other mining district. A water temperature as high as 160 deg. F. has been reported from the Ward shaft, and temperatures below the Sutro tunnel are very high in many instances. The control of excessive underground temperatures is effected by proper ventilation, or by the provision and distribution of air-currents of sufficient volume. Upon the Comstock of late years considerable attention has been paid to ventilation, and underground conditions have been much improved.

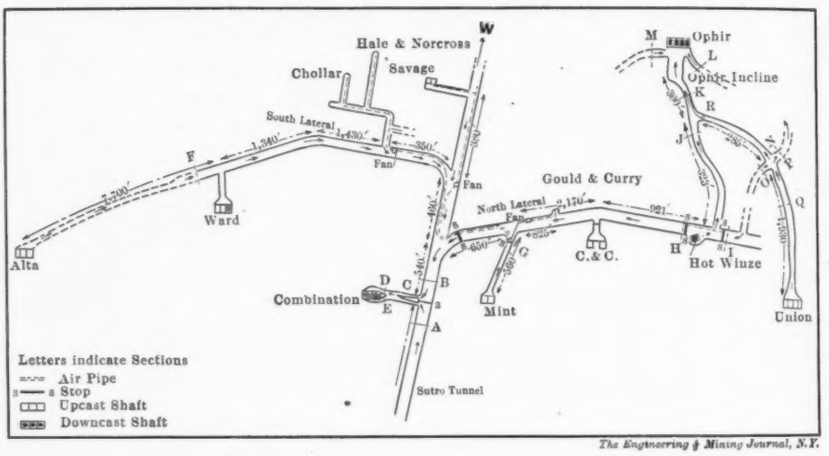


FIG. 1. PLAN OF SUTRO TUNNEL LEVEL, SHOWING DISTRIBUTION OF AIR

Ventilating System in General.

A ventilating current on the Comstock must provide pure air for the miners and a sufficient volume to temper the heat of the underground workings; also remove the steam and the gaseous products of blasting. A ventilating current of sufficient volume to cool the workings enough to be noticeable would meet all the other requirements. The general and considerable elevation of temperature along the lode makes it possible to secure air currents of some volume and velocity by natural ventilation alone. With the exception of the Ward shaft, all of the ventilation is effected by upcast shafts, supplemented by small fans for local distribution of the air in drifts, raises, stopes and winzes. Three shafts, the Ophir, the Combination, and the Belcher, are used as upcasts; six shafts, the Union, the C. & C., the Mint, the old Yellow Jacket, the Overman, and the Alta, are used as downcasts. The Ward shaft is divided by a brattice, and one compartment (the pump) is used as an upcast, the other two compartments, in which the hoisting is done, serving as a downcast. A fan is attached to the upcast compartment and exhausts the air.

Ophir Upcast.—This shaft takes the air from the workings of the Ophir mine, the downcast air coming principally from the C. & C. shaft. The upcast air is taken from a winze in the north lateral and by a crosscut to the Ophir incline, and thence to the foot of the Ophir shaft. At the foot of the Ophir shaft a south drift takes air from old stopes and workings of the Ophir mine, and an east crosscut connects with the Union shaft and takes air from that shaft.

Combination Upcast—This shaft draws air from the Sutro tunnel, both east and west of the Combination partition, which is so placed as to split the connection from the Combination shaft to the Sutro tunnel. The downcast air comes from the Union, Mint, and Alta shafts. The air from the Union crosses the current from the Ophir through a 20-in. galvanized-iron pipe, two wooden partitions keeping the currents from mixing. The air from the Mint shaft is taken through three lines of 15-in. air pipe, assisted by fans, to the Gould and Curry, the Savage, the Chollar, and the Hale Norcross workings. It is then returned through the north and south laterals to the Sutro tunnel, and thence to the Combination shaft. The air from the Alta passes through a long connection and into the south lateral near the connection to the Ward shaft. The air east of the

NOTE—Excerpt from preliminary proofs, not revised by the author, of a paper entitled, "The Ventilation of the Comstock Mines," *Bull.* No. 25, A. I. M. E., Nov., 1909.

*Professor of mining and metallurgy, University of Nevada, Reno, Nev.

[1]"The Comstock Lode; Its Formation and History," 1879.

Combination partition comes from the Sutro tunnel portal.

Belcher Upcast—This shaft ventilates the Yellow Jacket, the Overman, and the Caledonia mines, and draws air for this purpose down the old Yellow Jacket and the Overman shaft.

The total amount of upcast air from the three shafts and the Ward measures 235,835 cu.ft. per min., and the amount of downcast air measures 216,687 cu.ft. per min. The discrepancy between the two amounts is due to the difficulty of making accurate measurement of rise in temperature, leakage, variation in the velocity of the air current at different times, and the accession of water vapor and gases from the mine workings. Fig. 2 shows the relation of the underground workings, the principal upcast and downcast shafts.

Ventilating System in Detail

Union Shaft—The downcast air is taken to the 2000-ft. level, and thence by means of a 15-in. air pipe to a fan 600 ft. distant in the east crosscut. It is then forced to the face of the northwest crosscut, and also to the face of the south drift, distances respectively 500 and 1000 ft. The discharges are respectively 1042 and 796 cu.ft. per min. The combined discharge is 1838 cu.ft. per min. With an inflow at the Union shaft of 4287 cu. ft. per min., the delivery is 42.9 per cent. of inflow. The air returns through the east crosscut to the shaft and then passes up through the pump compartment, which is bratticed off, to the Sutro tunnel level, and then through a long connection to the south lateral and also to the connection leading to the Ophir shaft. The north lateral takes 4086 cu.ft. per min., and the remainder, 9728 cu.ft. per min., finds its way into the Ophir upcast. The average temperature on the 2000-ft. level is 98.3 deg. F. and on the Sutro tunnel level it is 76.3 deg. This is due to the fact that a comparatively large proportion of the downcast air leaks past the air-pipe on the 2000-ft. level and goes up the pump compartment, cooling the air coming from the Union workings. The portion of air passing to the Combination shaft traverses 12,061 ft. from surface to surface; the portion passing up the Ophir moves 7680. Fig. 1 shows in plan the distribution of the air on the Sutro tunnel level.

The Ophir Mine—The downcast air in the C. & C. shaft splits into four parts—one split on the 2150-ft. level, an air current of 7024 cu.ft. per min.; one on the 2250-ft. level, an air current of 14,521; one on the 2350-ft. level of 11,667, and one on the 2350-ft. level, which was not measured.

On the 2150-ft. level the air is taken through the drift to a point 860 ft. from the shaft, then picked up by a fan and forced to the Ophir winze and down through that connection to the stopes upon the 2200-ft. level of the Ophir. The fan takes 5389 cu.ft. per min., and the difference, 1635 cu. ft., leaks past a canvas curtain and joins the upcast air.

On the 2250-ft. level part of the air is taken by a fan at the station and forced down to the 2350-ft. level to ventilate the east drift; the remainder, amounting to 14,521 cu.ft. per min., passes into the drift until it reaches a stope, where two fans pick it up, one forcing the air past the stope into the Consolidated Virginia workings, the other forcing the remaining air down through the Ophir winze to the 2200-ft. level of the Ophir mine. The Consolidated Virginia fan takes 3323 cu. ft. per min., while the Ophir fan takes 11,566 cu.ft. per min. Beyond the stope another fan takes air from the Ophir winze station and forces it on the stopes north of the Ophir winze. This air rises up through the stopes and eventually joins the air in the "hot winze" of the north lateral. The fan takes 3791 cu.ft. per minute.

The air on the 2350-ft. level passes through the main drift, while the air from the fan on the 2250-ft. level passes into a crosscut and a drift east of the main drift, returns and joins the air passing through the main drift toward the Ophir winze. The high temperatures, noted previously, were taken in this drift before the connection was made. The average temperature before connection was 125.4 deg., and some months after the temperature measured 100.4 deg. The lowering in temperature was due to the increased volume of air and to the boarding-up (snow-shedding) of the sides and top if the drift, which very effectually shut off hot water, steam, and much of the heat radiated from the rock surfaces.

The 2450-ft. level is ventilated by a No. 8 cast-iron American blower. The air is taken through an inlet pipe extending toward the south compartment of the shaft and forced to the working face in the east crosscut, returning through the crosscut. The fan was not in operation at the time of my visit. On account of the danger of flooding this level the fan was driven by a compressed-air engine.

The total quantity of air in the three main splits amounts to 33,212 cu.ft. per min., and this compares closely to the 32,760 cu.ft. measured on the same day on the Sutro tunnel level.

Gould & Curry Mine—At the Sutro tunnel a west crosscut has been started, which is ventilated by an air pipe and fan taking air from the Mint shaft. The inflowing air at the shaft measured 1122 cu.ft. per min. (1159 cu.ft., November 15). A 15-in. air pipe takes this air to the fan, and from the fan a 11-in. pipe connects with the crosscut, distant 189 ft. The air discharged measured 989 cu.ft., or 88.1 per cent. of the inflow. The fan was not in use.

Savage Mine—An east crosscut is being run in the Savage mine from a raise 75 ft. above the Sutro tunnel, which also receives air from the Mint shaft. A 15-in. air pipe takes 2404 cu.ft. per min. to a fan 1110 ft. distant in the Sutro tunnel, and the fan discharges through a 15-in. pipe to the top of the raise and then by a 11-in. pipe to the working-face, 180 ft. distant from the top of the raise. The discharge measures 894 cu.ft. per min., or 37.1 per cent. of the inflow. The section of 11-in. pipe caused the most leakage. The fan was in operation at the time.

Hale & Norcross Mine—The Hale & Norcross receives air from the Mint shaft. A 15-in. air pipe leads to the Hale & Norcross connection in the south lateral, 1460 ft., and from this point a fan takes the air and forces to the Hale & Norcross and Chollar crosscuts, distant 325 ft. 11 in.; branch pipes take the air to the working faces, 190 ft. to the Hale & Norcross and 122 ft. to the Chollar. The Hale & Norcross discharge measures 941 and the Chollar 934 cu.ft. per min. The combined discharge measures 1875 and the inflow at the Mint 3761 cu. ft. per min. The discharge is 49.8 per cent. of inflow.

Sutro Tunnel—The Sutro tunnel is an incast airway and is the longest airway on the Comstock. The air enters at the portal and passes to the Combination partition, a distance of 18,700 ft.; then through the connection to the Combination shaft, a distance of 400 ft., and then to the surface, a distance of 1600 ft. vertically. The total distance is 20,700 ft.

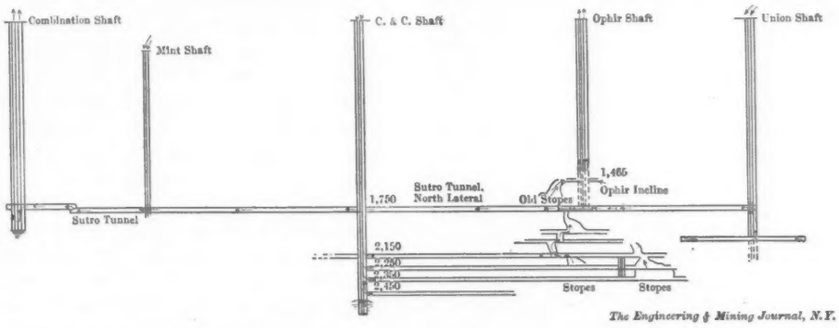


FIG. 2. LONGITUDINAL SECTION OF THE NORTH END MINES, COMSTOCK DISTRICT

This Combination shaft also serves to draw air from the workings west of the Combination partition. The average quantity of air from the east is 27,339 cu.ft. per min. (average of four observations at different times); from the west it is 29,961 cu.ft. per min. (average of four observations at different times); and the total average passing to the Combination from both directions measures 57,300 cu. ft. per minute.

Yellow Jacket Mine.—Three levels of this mine are open and operated from the old Yellow Jacket shaft. On the first level, the 900 ft., the air entering measures 3075 cu.ft. per min. The air passes through a drift and thence down a winze to the 1000-ft. level. The temperature and relative humidity of this air current, at a point 500 ft. from the shaft, measured 66.2 deg. F. and 55.6 per cent. respectively. The second, or 1000-ft. level, receives 3030 cu.ft. per min. from the shaft. Part of this air is taken by an air pipe and conducted a distance of 350 ft. to a raise on the footwall of the vein, returns, joins the remainder, and then passes down through old stopes to the 1100-ft. level.

The third, or 1100-ft. level, is closed by a door in the drift, so as to force the air down the incline, which heads at this level, into an old station which is being reopened. The air escapes up through old stopes to the 1100-ft. level. All the air passing down the Yellow Jacket shaft is brought together in the south drift, passes through a crosscut to the old Belcher incline, and thence to the surface through the Belcher shaft. The amount of air passing through the drift measures 10,665 cu.ft. per min. The 900-ft. level of the Overman and Caledonia, corresponding to the 1100-ft. of the Yellow Jacket, delivers 5981 cu.ft. per min. to the Belcher shaft. The total quantity of air measured on this level is 16,646 cu.ft. per min., while the average passing up the Belcher is 31,706, leaving unaccounted for 15,060 cu.ft. per min. This comes from the lower levels of the Overman and Caledonia, but no measurement was possible at the time. The Yellow Jacket air at the foot of the Belcher incline gave a temperature of 79.7 deg. and a relative humidity of 68 per cent.; the air coming from the Overman a temperature of 82.4 deg. and a relative humidity of 62.3 per cent.

Ophir and Belcher Upcasts.—The measurements of both these shafts shows an average of 22,222 cu.ft. per minute.

Combination Shaft.—The measurements of the Combination shaft average a total of 51,582 cu.ft. per min., with an average velocity of 450 ft. per min. This has a temperature at the shaft collar of from 80.6 to 89 deg. Fahrenheit.

General Conclusion

Since the cooling of the upcast air directly affects the efficiency of the upcast shaft, the factors contributing to this are of some importance. I reached the following conclusions:

(1) The greater the difference between the temperature of the upcast air and the rock temperature, the greater the cooling effect of the shaft.

(2) The higher the temperature of the air entering the bottom of the upcast, the greater the cooling effect of the shaft.

(3) The lower the velocity, and consequently the smaller the volume of air in the upcast shaft, with given area and rubbing surface, the greater the cooling effect of the shaft.

(4) The greater the proportion of rubbing surface to shaft area, the greater the cooling effect.

(5) Where incast and upcast air are conducted through the same shaft, the cooling effect of the incast upon the upcast air is very marked.

Regarding the effect of humidity upon the cooling effect of the shaft, no definite conclusion was reached.

Supplementary Ventilation

At the Ward shaft a No. 200 American, three-quarter housing, vertical-discharge, suction fan, driven by a 50-h.p. induction motor, is used to ventilate the workings of the shaft; and, as sinking is the only work, with the exception of the pump stations, practically the full capacity of the fan is used for this work. The incast air passes down the two hoisting compartments, and is deflected in part by a canvas curtain at the 2475-ft. station (pump station). The curtain is one-half the width of the compartment, and is suspended by its upper edge from a wall-plate on a level with the roof of the station. The lower edge hangs loose over the guard bar in front of the compartment. This gives a curved surface and deflects enough air to ventilate the station, while allowing the cage, in passing down, to sweep it out of the way. The greater part of the air passes down to the sump and then rises through the pump compartment, which is bratticed off from the hoisting compartments.

Control of Humidity and Heat

Control of humidity and heat is a matter of considerable importance as affecting the efficiency of the miners. High temperatures and saturated air are conducive to low labor efficiency, while, on the other hand, high temperature with low humidity does not lower efficiency to an unreasonable extent. The examples in the previous section show that if water can be kept away from the air a moderate humidity is possible, but this cannot always be done. Careful boxing of drains and boarding-off hot water is beneficial; the carrying of large quantities of drainage water in closed conduits, such as the stave pipe, is very effective, but, on the whole, the mine drift or tunnel cannot be considered an ideal air-way under high temperature conditions. However carefully the drainage water may be carried, the emanation of water vapor from the walls and surfaces of the timbers still remains as an important humidifying agent. The construction of moisture-tight walls for the drifts is out of the question, and the use of excessive volumes of air impracticable. The carrying of air through sheet-metal conduits of moderate cross section is the only practicable way of delivering air currents of low humidity to working places where a high temperature prevails, and this method is in general use upon the Comstock. The small sections of the air pipe as compared with the drift requires the use of power-driven fans to force a sufficient quantity of air. The working face of a dead end, such as a drift, is perhaps the most difficult to maintain in proper condition, and as a consequence a number of measurements were in the ends of drifts ventilated by pipes.

Cost and Operating Expense

It is almost impossible to obtain detailed figures on the cost of the ventilating system, but fairly accurate estimates may be made. The accompanying estimate was made by taking the cost of motors and fans and adding 20 per cent. for cost of installation. The 15-in. air-pipe in place was estimated as $0.77 per ft. and 11- and 20-in. proportionally:

Cost of supplementary ventilating plant—Motors, $6,000; fans, $6,000; air-pipe, $10,000; total, $22,000. This does not include the cost of the fan and pipe in the Overman and Caledonia mines, nor the cost of electrical conduits.

Depreciation, maintenance, and operating expense—Depreciation and maintenance assumed as 10 per cent. of plant cost, or $2200 per annum, or per month, $183.

Operating cost—Power: 165 h.p., at $5 per h.p. month, $825; electrician, at $4 per day, $120; incidentals, $50; total expense per month, $1,178. Shift bosses and miners take immediate charge of fans and motors, and no extra men are employed except the electrician.

The expense of maintaining the upcast shafts may be properly charged against the cost of ventilation, and this is a large item, but at present no figures are available. During the past year shaft crews of from four to six men have been employed on single shafts in all three upcast shafts for periods of from 2 to 6 months. On an average this work has to be done every other year. On the foregoing estimate of expenses per month, the cost of each 10,000 cu.ft. of air passing through the mines is $0.00116, not including the cost of repair of upcast shafts.

The exportation of antimony ore from Bolivia in 1908 was 734 metric tons against 2279 tons in 1907.

A New Gas Producer for Low Grade Fuel *

By Alfred Gradenwitz

In spite of the enormous strides made by the makers of steam engines and steam boilers, suction-gas plants and liquid-fuel combustion motors are rapidly gaining ground because of the extraordinary saving in fuel insured by their use. The Deutz gas-motor factory, Cologne, has taken a further step in advance toward reducing the cost of fuel by designing an improved gas producer for low-grade fuel which appears to combine simplicity and safety of operation with durability and reliability. This producer takes the very cheapest classes of fuel such as anthracite dust, anthracite rubbish, coke rubbish, smoke-chamber coal dust, etc., for which no satisfactory use was previously available. Though the first cost of such a plant is slightly higher than that of a plant for gasifying the usual kinds of fuel, the advantage is very great because of the extraordinary difference in the cost of the fuel.

The coal-dust generator consists of a rectangular pit with a step grate and a circular fuel reservoir having an "overflow" edge on which the hight of the active fuel bed depends; in the lower part is a water sump. Both above and below the grate are slag doors; only the lower ones have to be kept open during operation. The fuel bed is kept at a constant hight by discharging the slag and ashes through the sump as they accumulate in the lower part of the step grate.

The mixture of steam and air admitted below the step grate can be accurately controlled as to its composition by a regulating cock, the steam being generated in an exhaust-heat boiler by means of the exhaust gases from the engine. This process avoids the drawback inherent in the vaporizers fitted into the generator, of withdrawing heat from the gas-generating process. It is likewise superior to steam generation from the heat of the incandescent zone of the generator, as this in the case of fuels containing large percentages of ash (as in the present case) is quite inadequate, and involves some risk of excessive heating and scorification of the grate.

Fig. 3 illustrates the arrangement for providing uniform distribution of the supplied air to the whole of the grate area. Experience has shown that in this type of generator an excessive amount of air may pass along the wall, so that the ozygen is not utilized sufficiently, while the formation of slag on the wall is assisted. In order to do away with this drawback, the overflow edge of the fuel reservoir, on which depends the hight of the fuel bed on the grate, has been so designed as to bank the fuel higher on the walls, thus offering a greater resistance to the passage of air along the latter than in the center of the grate. This arrangement has in practice given excellent results.

In connection with tests recently made by Engineer Hildebrand at the suggestion of Professor Josse of the Charlottenburg Technical High School, there was used anthracite dust of from 3 to 8 millimeters and a heat value of 7300 calories (about 13,000 B.t.u. per pound), costing 8 marks per 1000 kilograms (about $2 per ton). After issuing from the producer, the gases pass through a dust separator, a scrubber and a purifier of the type generally used in connection with Deutz suction-gas producers. Those tests extended over three days, and only small quantities of slag discharged occasionally during operation, without any reduction in the output of the engine.

The weight of the ashes taken from the generator was about 10 per cent. of the fuel supplied. The consumption of anthracite dust was found to be 445 to 446 grams per horsepower-hour (about 1 pound per English horsepower-hour), the amounts of material withdrawn during the discharging of slag being deducted. The cost of fuel thus worked out at 0.35 pfennig per horsepower-hour (about 0.09 cent per English horsepower-hour).

In the case of coke dust, the cost was found to be even lower; a consumption of from 750 to 800 grams was obtained with coke dust of 5700 calories from the

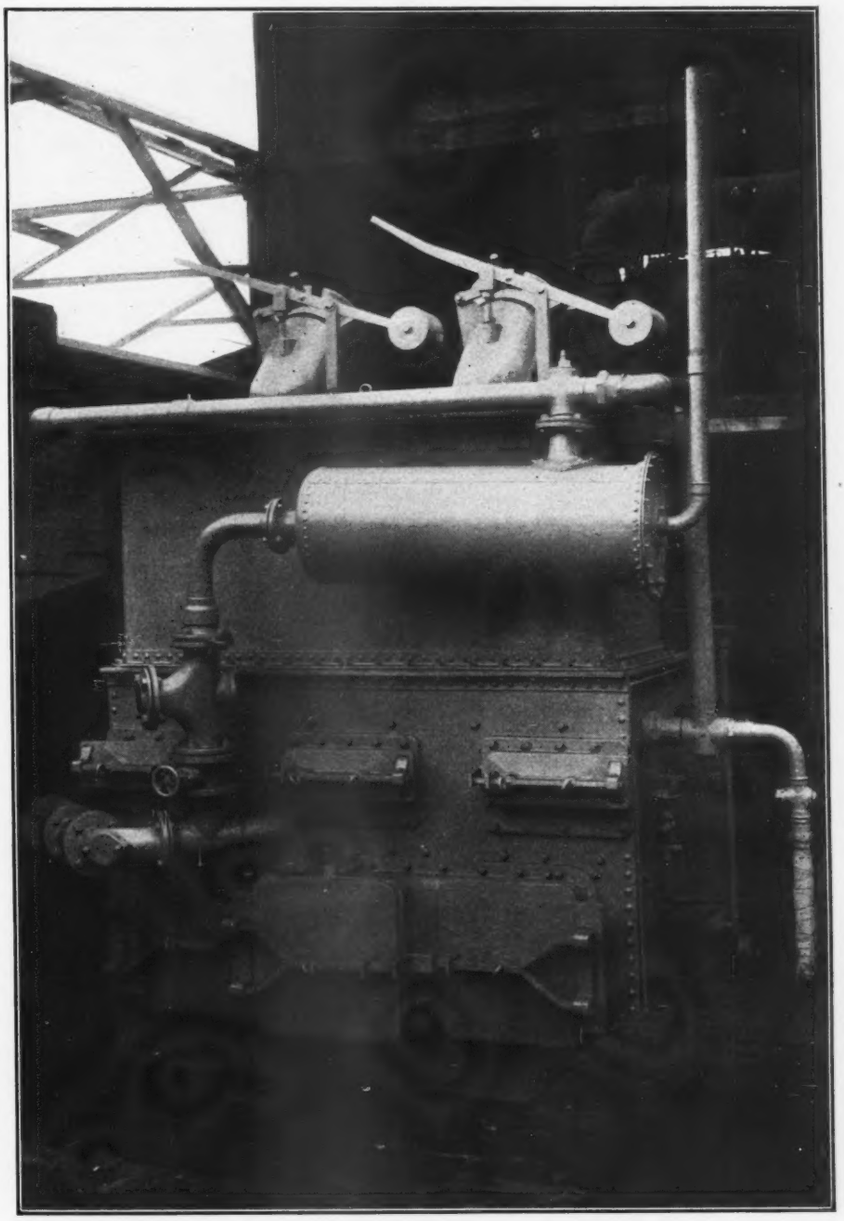


FIG. 1. DEUTZ GAS PRODUCER FOR LOW-GRADE FUEL

*Reprinted from Power, Oct. 19, 1909.

Stuttgart municipal gas works, the material withdrawn from the sump being left unutilized.

Especially remarkable results were obtained in connection with smoke-chamber coal dust taken from the smoke chambers of locomotives. This material, as used in connection with one gas producer of the above type in operation at Swinemünd, forms a reddish-brown sandy powder, containing 55.6 per cent. of solid carbon and having a heat value of 4500 calories. Of this was consumed about 0.75 to 1 kilogram per horsepower-hour, and in tests made on delivered work a consumption of 1.28 kilograms was registered for each kilowatt-hour, corresponding to a consumption of about 0.77 kilogram per brake horsepower-hour.

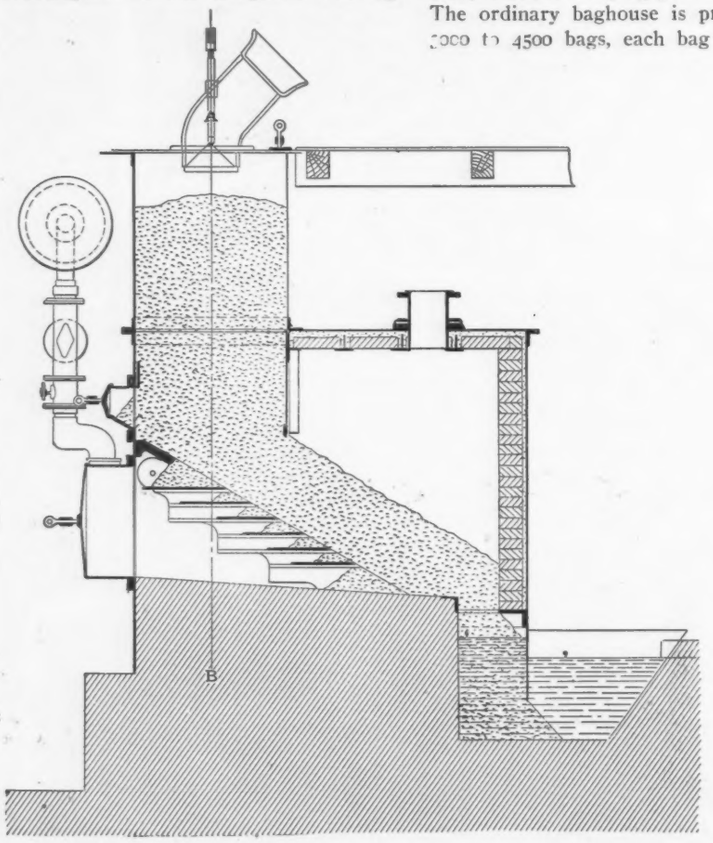


FIG. 2. LONGITUDINAL SECTION OF DEUTZ GAS PRODUCER

Sept. 22 was the thirtieth anniversary of the first make of basic converter steel in Germany. The Hoerde Works and the Rheinische Stahlwerke, according to *Stahl und Eisen,* jointly acquired the right to use the Thomas-Gilchrist process in Germany early in 1879, and both works started their first furnaces on the same day, as it happened, though without previous arrangement. The process proved to be specially adapted to the high-phosphorus pig so largely made from German ores, and soon came into general use. From the first beginning 30 years ago up to the end of 1908, German works made 84,183,220 metric tons of Thomas, or basic converter steel.

The Baghouse and Its Recent Applications

By W. C. Ebaugh*

For lead and zinc furnaces the baghouse has long been recognized as a most efficient means for removing solids from smoke. Fans capable of moving 150,000 to 250,000 cu.ft. of gas per minute force the flue gases, laden with dust and fume, through a number of large pipes or flues into the smoke cellar and through the bags, and the solids are removed so perfectly that the escaping gases are invisible. The ordinary baghouse is provided with 3000 to 4500 bags, each bag being about 18 in. in diameter and 30 to 33 ft. long. Whereas the earlier baghouses had 750 to 1100 sq.ft. of filtering surface per ton of charge, modern practice finds 300 to 500 sq.ft. per ton of charge ample. (In zinc filtration a ratio of 150 to 200 sq.ft. of filtering surface per square foot of hearth is customary.)

As a filtering medium cotton cloth having 42 to 50 threads to the linear inch and weighing 0.4 to 0.7 oz. per sq.ft. was largely used. The objection to this material was that when used at a temperature approximating 200 deg. F. it became brittle and broke, and if used at temperatures near 100 deg. it became weakened by the acid substances in the filtered solids. It was soon learned that bags made of woolen material, like flannel, not only withstood the action of the corrosive agents better than did cotton, but that the woolen fabric retained its elasticity even when used at temperatures of 250 to 270 deg. F. Perhaps this is due to the relatively nonvolatile oil contained in the wool, or to the nature of the nitrogenous fiber itself. Modern practice, therefore, is to use the expensive woolen bags rather than the cheaper ones made of cotton. To obtain the benefits of wool, but at a less cost, Iles[1] proposed that a fabric be used in which the warp should be wool and the weft cotton, or *vice versa,* and Sheedy[2] suggested that the lower section of a bag should be made of flannel (wool) and the upper portion of muslin (cotton). The most recent experience has shown that vegetable fibers should not be used at all. Even linen thread for stitching is unsatisfactory.

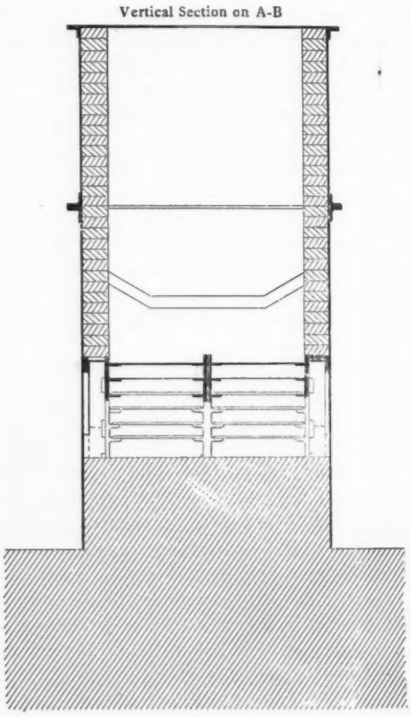


FIG. 3. CROSS-SECTION SHOWING GRATES

Dampers to Keep Temperature Constant

When woolen bags are used a wide range of temperature is permissible. Perhaps 150 to 175 deg. F. is safest, but a minimum of 70 deg. F. and a maximum of 270 deg. F. have been used. The best practice is to adjust dampers at the furnaces and in the flues so as to maintain the temperature as near 160 deg. F. as possible. Under these conditions the material collected in the bag will be dry and filtration can go on rapidly. Lead blast-furnace gases are usually so cool that

*University of Utah, Salt Lake City, Utah.
Note—Excerpt from an article in *Journ. Ind. and Eng. Chem.*, October, 1909.

[1]U. S. Pat. No. 485,797 (1892).
[2]U. S. Pat. No. 480,834 (1892).

their treatment in a baghouse can take place directly, but the gases from copper furnaces and most roasters ordinarily require cooling. This is effected either by a suitable flue system, which must be as elastic as possible, or by the admission of cold air into the flues with the gases.

Until the investigations of Rhodes and Sprague (1907-1908) had shown the possibilities of filtering neutralized gases, the baghouse was looked upon as not suited for copper-furnace and roaster gases. These experimenters, impressed with the fact that the baghouses at zinc works were sometimes managed in what seemed to them, as lead and copper smeltermen, a very reckless fashion, yet with little apparent ill effects, conducted an extensive series of investigations with a miniature baghouse. A variable-speed motor drove a fan that drew gases from a flue and then forced them through a 4-in. pipe into a cylindrical dust chamber 2x5 ft. Upon this cylinder were placed two nipples over which bags were tied. Necessary thermometers, manometers and other instruments were provided, and a house of corrugated iron inclosed the whole apparatus.

This experimental baghouse was set up at various parts of the flue system of a lead and copper smeltery, and the effects of the flue gases with their accompanying solids were determined. During this series of tests neutralizing copper blast-furnace and lead-roaster gases by means of zinc oxide were tried, and the results were so satisfactory that now the lead plant is operated under conditions suggested by them for filtering all the smoke from the blast furnaces, hand roasters working on matte, and converter or pot roasters charged with ore. Stacks, which under ordinary conditions emit large volumes of dense smoke, send only colorless gases and no solids into the atmosphere when the bag-filtration plant is used. An observer would judge from the appearance of the stacks that the smeltery was not running.

Under this system of operation, zinc-roasting furnaces for the treatment of zinkiferous middlings have been erected, and the flue from these furnaces leads directly into the main roaster flue. The middlings, mixed with fuel, are roasted on a grate and the liberated sulphur dioxide and zinc oxide pass into the roaster flue, where the latter oxide neutralizes the corrosive sulphur trioxide that comes from the roasters. Provision is made at the baghouse fan for adding ordinary zinc oxide constantly, if need be, by an automatic feeding device.

It would not be economical to use this method, under ordinary conditions, with roasters of the hand or McDougal types, because of the large quantities of sulphur trioxide produced by them; but the treatment of the gases coming from pot or converter roasters presents no difficulties. In these the amount of sulphur trioxide is relatively much less than in the hand- or McDougal-roaster gases, and zinc-oxide neutralization is commercially possible. Were this small amount of sulphur trioxide not neutralized, however, the filtering bags would soon be destroyed.[3] Gases from copper blast furnaces, reverberatories and converters are amenable to treatment under the conditions herein given.

Bags Suspended from Levers

An item of importance in baghouse operation is the means adopted for shaking the bags. Originally the method used was to shut off the gas from a set of bags, open the doors in the bag room, and after the noxious gases had escaped shake the bags by hand. This was at best a disagreeable—even dangerous—task and consumed much time. At East Helena a device was provided whereby an attendant could move a lever on the outside of the bag house and have a set of beaters strike against the rows of bags within. The scheme was abandoned, both because the shaking was ineffectual and the wear and tear on bags was great. Rourke[4] attached ropes or wires to rings placed around the centers of bags so that a whole row could be shaken by jerking the end of the rope extending outside the building. The most satisfactory device is one designed by Benedict[5] in which the bags are suspended from short levers attached to a central shaft. The outer end of this shaft projects beyond the wall and is provided with a larger lever, so that when this lever is moved to and fro the tops of the bags are given a similar motion, and a wavy motion is imparted to the bags as a whole.

The baghouse product, collected in the dust chambers or smoke cellar, usually has a black or dark gray color, is quite light (density less than water) and can be handled with difficulty when in its original state. Therefore it is burned. Some oily waste is lighted and thrown upon it, the doors to the dust chambers are opened, and a fan draws the fumes through a flue situated at the back of the chamber and discharges them into the main flue leading to the baghouse. Here the fume evolved during the burning is caught in a part of the house that is operating as usual.

The material on the floor of the dust chamber burns slowly like punk, gradually sinters to a product resembling soft lava, and loses some of its arsenic and sulphur. The burning continues a number of days, and then the sintered proudct goes to an arsenic refinery. The white arsenic is volatilized and used as such, and the residual cinder is charged again into the lead blast furnace. Thus the arsenic, lead, copper and precious metals are recovered.

[3]Hand roasters present a double difficulty. Not only is the production of sulphur trioxide large, but the products from coal firing seem to make the bags and their contents liable to spontaneous combustion—a combustion that is not accompanied by flame, but is more like that which one observes in the burning of punk.

[4]U. S. Pat. No. 530,553 (1894).

[5]Patent pending.

Workmen's Health Must be Watched

The labor question has been a serious one in baghouse management, and the expenditure of thought and care upon the welfare of the men is imperative. It will not do to put any kind of a laborer in charge of a baghouse. The foreman should be at least as able as the charge-floor foreman or the head furnaceman, and his helpers should be capable of understanding orders and executing them implicitly. A wash room divided into three parts should be provided. The laborer enters the "clean room," disrobes and places his clothing in sanitary lockers, passes through the "wash room" into the third room and there dresses in heavy underwear, socks, overalls, jumper, cap, gloves and shoes provided by the company. His shift completed he leaves his working clothes where he got them originally, bathes thoroughly from head to foot, using plenty of soap and hot water, and then passes from the wash room to the locker room he entered at first, and there clothes himself.

Constant watchfulness on the part of the management is necessary to make sure that the washing is done regularly and thoroughly. Careful attention must be given to the health of the men, and at the first appearance of arsenical or lead poisoning proper antidotes should be administered and the men ought then to be transferred to some other kind of work until recovery is complete. When regulated as here indicated, the same crew of men can work at a baghouse for months at a stretch without discomfort or danger.[6]

The objections to the use of a bag house are: (1) Cost of installation[7]; (2) cost of maintenance; (3) artificial draft must be substituted for natural draft; (4) danger to operatives; and (5) the arsenic saved as a by-product is sometimes disposed of with difficulty. To offset these disadvantages we must consider: (1) The greater recovery of metals; (2) regularity in draft and ventilation; (3) greater safety and less discomfort to the inhabitants of the region surrounding the smelter, and consequently less expense for lawsuits.

Consul Robert S. S. Bergh, of Belgrade, announces in a recent report the discovery of antimony-containing terrain, in the center of Servia, a few miles from the railroad town of Yagodina. The ore is in quartz and contains over 60 per cent. antimony. The expert's opinion is that, notwithstanding the present low price of antimony and its fluctuating value, the exploitation ought to pay. The total Servian export of antimony during 1908 amounted to $29,250, of which the United States purchased about one-tenth.

[6]Some idea as to the dangerous nature of the bag house dust may be gained from the fact that it contains from 10 to 30 per cent. arsenic, and from 15 to 50 per cent. lead.

[7]A bag house of 4000 bags will cost approximately $150,000.

Condition of the Quicksilver Industry in Texas

Depth of Workable Ore Estimated at 1600 ft.; Attention Turning toward Bituminous Ores. Coal for Producer Gas Near Mines

BY WILLIAM B. PHILLIPS*

In the Terlingua quicksilver district there are now seven furnaces equipped and ready for regular business, the Scott furnace being used.

FURNACES IN THE TERLINGUA DISTRICT.

Name.	Number of furnaces.	Daily capacity in tons.
Marfa and Mariposa Mining Company	2	20
Terlingua Mining Company	1	50
Colquitt-Tigner Quicksilver Mining Company	1	10
Chisos Mining Company	1	20
Big Bend Cinnabar Mining Company	1	50
Texas-Almaden Mining Company	1	20
Total	7	170

Of these seven furnaces, only two are now in operation, viz., one 10-ton furnace of the Marfa and Mariposa Mining Company, and the 20-ton furnace of The Chisos Mining Company. Of the 5 idle furnaces, 4 have not been in operation for several years (Telingua Mining Company, Colquitt-Tigner, Big Bend and Texas-Almaden), so that the discontinuance of work at these plants can not be ascribed to any very recent causes.

It is not the purpose of this article to discuss the reasons that may have led the owners to close down. It would require an intimate acquaintance with the physical and financial condition of each company to enable one to speak of this matter at length. The fact that only two furnaces out of seven are in operation and that these two have a combined daily capacity of 30 tons out of 170 tons total capacity for the district need cause no apprehension that the supply of ore is being exhausted or that the cream of the ore has already been taken. The two large furnaces, each of a daily capacity of 50 tons of ore, were built at a time when the local conditions were not clearly understood. As these conditions were more and more closely studied, especially those that dealt with an adequate supply of efficient labor and a regular supply of fuel, it became apparent that the large furnaces were much in advance of the times.

On this account I am inclined to exclude them from this discussion and to consider that I have to deal only with the smaller furnaces that are out of commission. If this be done, there are two 10-ton furnaces and one 20-ton that should be running. These three have a combined daily capacity of 40 tons. In other words, out of a total daily capacity of 70 tons the furnaces now in operation are treating 30 tons, or about 43 per cent. of the smelting capacity of the district. Remembering that the district is 100 miles from the railroad and that wagon freight is 50c. per 100 lb., this is by no means a bad showing.

Furthermore, during the last year there has been erected a new Scott furnace of 20 tons capacity, well designed and well built, by a company that has shown no disposition to take any undue risks. In the face of the idle furnaces, and after a long experience with D-retorts and a leased furnace, this company has built a furnace on its own property, has carried the main shaft down to the 500-ft. level, a second shaft to the 300-ft. level, a third shaft to the 125-ft. level, and is now preparing to sink a larger shaft to the 1000-ft. level. This does not look as though the district were dead or that people who know it are afraid to spend money here. Another company, long in the district and owning an excellent 20-ton Scott furnace, has put down a number of diamond-drill holes with satisfactory results and is about to resume active operations.

Greatest Production from the Limestone

The total production of quicksilver in Texas from 1897 to the close of the present year will approximate 40,000 flasks containing 75 lb. each and of a total value of about $1,800,000. By far the greater amount of this yield has been obtained from the rich deposits of cinnabar, terlinguaite (a yellow oxychloride of quicksilver) and native quicksilver which were found in and around California hill, in the Edwards limestone of the Lower Cretaceous. Many of these deposits were extremely rich and lay near the surface, so that expensive mining operations were not required. The furnaces that were running on this ore and that were well looked after gave results that were highly satisfactory to their owners.

It was not unusual for some of these pockets in the limestone to yield $10,000, $15,000 and $20,000 worth of quicksilver, and at one famous locality, near California hill, the waste dump did not comprise 10 per cent. of the material removed, more than 90 per cent. being sent to the furnace. This place was characterized by the presence of large masses of terlinguaite, mixed with native quicksilver, and within a short distance of it a cavity in the limestone yielded 150 lb. of native quicksilver which was dipped up with a cup and bottled on the spot.

The Edwards limestone in the Terlingua district is characterized by many veins of calcite, aragonite and gypsum which traverse it in all directions. While the general course is northeast-southwest, the ore-bearing veins ramify in all possible directions and exhibit no recognized regularity. They are not continuous but are to be regarded as pockets or chambers of calcite connected by stringers (*hilito, pegason*) of the same substance. These chambers are frequently lined with beautiful crystals of calcite and aragonite together with many curious forms of gypsum, the long, slender, curved semi-crystallized variety predominating. A deeply colored, amorphous hematite is often present and has caused some grievous mistakes, being taken for cinnabar by some of the earlier prospectors.

Some of the handsomest specimens of cinnabar exhibit an outer shell of deeply colored hematite, the cavity inside being lined with calcite, gypsum and cinnabar. The new quicksilver compounds, terlinguaite, eglestonite and montroydite, were found in the Edwards limestone in close association with native quicksilver. As these are oxychlorides one may refer their origin to the action of saline waters on cinnabar. I have in my possession a piece of shale showing cinnabar surrounded by terlinguaite, the contrast between the deep yellow of the terlinguaite and the rich crimson of the cinnabar being especially attractive. I was fortunate enough to discover a new locality for terlinguaite recently, finding it in the Eagle Ford shales six miles east of the original locality at California hill. Until this new discovery it was not known that terlinguaite occurred in the Eagle Ford shales, all of the former occurrences being in the Edwards limestone.

Two Classes of Ore

As has been shown already in the columns of the Journal the Brewster county quicksilver area falls naturally into two great divisions, separated by what is known as Vogel's Draw (Long Draw). On the west side of this broad arroyo, with its steep western wall of Edwards limestone, is the limestone of the Lower Cretaceous with here and there a small inclusion of the Eagle Ford shales, both yellow and bluish-black. On the eastern side is the shale of the Upper Cretaceous with an occasional small inclusion of limestone and the tenacious clays of the coal measures. This shale is highly bituminous and in the old D-retorts that

*Director, Bureau of Economic Geology, Austin, Texas.

were formerly used it yielded quicksilver, lubricating oil and illuminating gas. It was a common sight to witness quicksilver and lubricating oil coming at the same time from the condensing pipe while the gas could be lighted.

With the exception of a few thousand flasks, probably not more than 5000, the quicksilver has been yielded by the Edwards limestone rather than by the bituminous shales. The product of the Marfa and Mariposa company, the Terlingua Mining company, the Lone Star Mining company (now out of business), and the Colquitt-Tigner Company (in part) was obtained from the deposits in the limestone, while The Chisos Mining Company, the Big Bend and the Texas-Almaden treated the ore from the shales, the Big Bend and the Texas-Almaden also treating ore that was carried by the rhyolite of Study butte and Maverick mountain. The longest continued and most successful operations have been confined to the limestone where the rich pockets gave opportunity for easy and inexpensive mining, yet comparatively deep shafts have been sunk in this limestone, the deepest being nearly 600 ft.

The thickness of the limestone is about 1600 ft. and within this depth it is thought that profitable operations may be conducted. With the present equipment of the furnaces within the limestone area it is probable that ore carrying as low as 0.75 per cent. of metal can be treated profitably, this being considerably below the average of the material sent to the furnace. It is possible that the limestone ore can be treated at a less cost than the bituminous ore and that a lower tenor of metal can be used as a basis of estimates. But this difference might disappear if, in the construction of the furnaces designed for treating the bituminous ore, the space between the tiles was reduced to 4 in. in order that the fines could work down more regularly and uniformly. The fines from limestone ore do not seem to hang on the tiles as persistently as those from the bituminous ore and daily capacity is increased, with a corresponding decrease in the cost accounts.

The Scott is an excellent furnace, but it seems to me that closer attention should be given to the radical difference between the limestone ore and the bituminous ore, especially when one considers that in the latter there may be considerable amounts of pyrite in addition to the bituminous matter. It is possible that some of the bituminous ore yields a coke-like substance that adheres to the tiles and prevents the regular sliding down of the ore, especially the fines, but there are no positive data on this point.

Exploiting Bituminous Area.

Inasmuch as the tendency in the district is decidedly toward the bituminous-shale area between Vogel's draw and Rough run, the treatment of such ore should receive greater attention. This is the area within which the more extensive operations will be conducted in the future, and this without any disparagement of the limestone area. It can not be said that the ore deposits within the limestone area have been exhausted. On the contrary it is my deliberate opinion, based on an intimate acquaintance with the entire field, that this area can furnish as good and as much ore as has been removed from it. That the greater interest is now being shown in the eastern part of the field can not be taken to indicate, in the slightest degree, the passing of such properties as the Marfa and Mariposa, the Terlingua and the Colquitt-Tigner from the realm of profitable production.

Causes entirely apart from the available ore supply have directed attention to the shale area. Among these may be mentioned the decreased mining costs, somewhat cheaper fuel, a better water supply and a much better and shorter road to the railroad. The last item cuts no figure in transportation costs, for the Mexican freighters charge just as much for hauling from Marathon, 90 miles, as from Alpine, 100 miles, or from Marfa by way of Alpine, 130 miles. It is 50c. per 100 lb. and they do not regard distance at all. Whether they are five days on the road or ten does not disturb their serenity or enter into their calculations.

Another reason for the renewed interest in the bituminous shale area is the possibility of the construction of the Kansas City, Mexico & Orient Railway from San Angelo to Presidio del Norte by way of Marathon instead of Alpine. If this route is selected the shale area would be within a day's ride by rail over a fairly good road. There has been much discussion of the relative value of the several routes proposed for this road and I have no opinion to offer at this time. All that I desire to say is that if the Marathon route is chosen there would be a saving in distance of between 35 and 40 miles, an avoidance of the heavy grades at Paisano Pass and a diminution of the distance from the quicksilver and the coalfields in the southern part of Brewster county of 40 miles. The quicksilver region has already been proved, with a credit, to the end of this year, of 40,000 flasks. The coal area remains to be proved, but it is thought that the beds in the lower part of the county and immediately adjacent to the quicksilver area are well worth attention, especially those at Rattlesnake mountain.

Coal for Producer-gas at Hand

There is not a large available supply of wood for fuel and the time will come when the fuel question will press with some insistence upon the furnace operators. Already one of them is considering the hauling in of oil in tank wagons. This I do not think is advisable, but it is advisable to consider the making of producer-gas from local coal and using it as fuel in the furnaces. It is quite idle to say that only wood can be used in quicksilver furnaces. In the first place it is not true, for coal is used for furnaces that work just as economically as the wood-fired furnaces. In the second place, if it has been true in certain localities, it would be a serious charge against metallurgical engineers to say that no other fuel can be used. It is freely granted that, as some furnaces are designed and built, wood is the only fuel that can be used, but to say that because this is true it is likewise true that no quicksilver furnace can be successfully operated with producer-gas as fuel is to belittle the entire science of metallurgy.

The coal that is within an hour's horseback ride from the center of the quicksilver area in Brewster county would make a good quality of producer-gas and solve for many years to come the question of fuel supply for the furnaces and for the hoisting, pumping and crushing. No one claims for this coal that it is a high-grade bituminous coal or that the area underlain by it is extensive. But there is enough for all local purposes and the quality is good enough for the making of producer-gas.

In this part of Texas we have to deal with a region that lacks but little of being a desert. The rainfall is scanty, certainly not more than 8 or 10 in. per year, and this falling within two to three months. When it does fall it runs off with distressing rapidity or is absorbed by a soil that is always extremely thirsty. Within the limestone area there are many excellent sites for impounding dams and one of the companies has a number of such dams, the largest one holding a million gallons, an ample supply of good drinking water for a considerable camp.

Two of the companies, the Big Bend and the Texas-Almaden, have used steam power for hoisting, pumping and crushing, obtaining the water from Terlingua creek through a pipe line 1¼ miles in length. The other companies use gasolene engines. Terlingua creek traverses the heart of the shale area, and, while it is not a continuously running stream, yet there are stretches, pools, etc., that never go dry and afford plenty of water for boiler and domestic purposes. For boiler purposes this water has to be treated with a boiler compound and it then acquires fair steaming qualities. It is now proposed by one of the companies to pipe an excellent water from the Christmas mountains, a distance of 7 to 8 miles, the difference in elevation being about 800 ft. The supply of water to be secured in this way would be enough for boiler and

camp purposes, but would not run a Pelton wheel for power.

In the limestone area there is very little mine water to handle and at least one of the mines in the shale area has no water at 500 ft. But other mines in the shale district have had a good deal of water at depths less than 200 ft., especially those near Terlingua creek and between this creek and Maverick mountain. This may be due to the fracturing of the shales near the contact with the rhyolite of Study butte and Maverick mountain. The mine water here has so far resisted all attempts at beneficiation and is allowed to go to waste, or to the irrigation of nearby lands. An enterprising Mexican built ditches and flumes for conveying the water to his farm and used to complain, when the pumps were not running, that the mines were ruining his business. It is easy enough to construe a privilege into a right and the Mexican, on his little labor, thought he had a real grievance when the water failed to reach his beans, chile verde and watermelons.

The thickness of the bituminous shales carrying the cinnabar has been estimated at 1200 to 1500 ft. and it is likely that workable deposits will be found to this depth. In the absence of deep bore-hole records we have to depend upon general geological conditions for estimating the thickness of these shales.

Low-grade Ore Can Be Treated

What is the quicksilver content of the ores mined and treated in the Terlingua district? To this question there can be no direct answer returned for the reason that there are no published records of the amount of ore treated. The total production can be obtained but not the output of ore. Failing other information on this point I can but give my own experience in the district. During 1905 and 1906, I mined and treated, from the bituminous shales, more than 3000 tons of ore which averaged a trifle over 2 per cent. quicksilver. A much higher yield than this could have been secured but it was thought best to grade the ore to this standard and keep the furnace running on material of about the same grade. From this particular property there should be no special difficulty in sending 20 tons a day of this grade of ore to the furnace for a long time. I know that much better ore than this has been sent to the furnaces operating in the limestone area, and also ore by no means as good. The same observation holds true with respect to the ore from the bituminous shales elsewhere than at the locality under notice.

The future of the district depends not so much on what has been done as on what can still be done, on the quality of the ore that can be sent to the furnaces regularly. With properties comparatively undeveloped, *i.e.*, having not a great deal of assayed ore blocked out, the question of ore value is always difficult. The opinion has already been expressed that some of the furnaces can work profitably on ore carrying 0.75 per cent. quicksilver and I am inclined to take this as the lowest content that can now be successfully handled. The ore now being treated is certainly much better than this, perhaps twice as good, on the average. With 1.50-per cent. ore and an extraction of 95 per cent., a flask of quicksilver would represent 5282 lb. of ore or 2.64 tons. With Mexican labor it is not likely that the mining cost is below $6 per ton, or $15.84 per flask. A 10-ton furnace running on such ore will consume about a cord of wood per day at $7 per cord. The 10 tons represent 3.79 flasks and the fuel cost is, therefore, $1.85 per flask. The mining cost and the fuel cost will thus be $17.69 per flask. If one allows $7.31 per flask for all other expenses, the total cost per flask is $25, leaving from $15 to $17 per flask net profit. The distribution of the costs may not be as indicated but the final result will be about as given for the district on an estimated yield of 75 lb. of metal from each 2.64 tons of ore sent to the furnace.

Good Maps of the District

There are excellent maps of the quicksilver district, prepared by the U. S. Geol. Surv., in co-operation with the University of Texas Mineral Survey. This latter survey was discontinued in 1905, but the recently established Bureau of Economic Geology is designed to take its place as far as possible. The ownership of the lands within the known area is of three kinds; private, railroad and public-school fund. Information with respect to the railroad lands can be obtained from the Southern Pacific Railway, Houston, Texas; and from the commissioner of the general land office, Austin, with respect to the public lands. Requests for copies of the State mining law governing the acquisition of claims, etc., should be addressed to the latter official. The largest body of private lands there is now held by the Gaines Land Company, Austin, about 56,000 acres in the heart of the bituminous shale area with known deposits on it. Requests for information concerning these lands should be addressed to this company. The Watkins Land Mortgage Company, Lawrence, Kansas, also owns a large holding of contiguous land and on a portion of it cinnabar has been found.

According to *Echo des Mines*, the sales of Spanish iron ore to American blast furnaces will attain 400,000 metric tons in 1910, or 100,000 more than in 1909. The purchasers are chiefly furnaces in eastern Pennsylvania. Price will be 7¾c. per unit, f.o.b., customs dues included, for 55-per cent. ore dry, which is ¼c. more than the latest sales, or ¾c. reckoning new duty.

Conditions on the Rand

Special Correspondence

The report of Consolidated Mines Selection Company, Ltd., for the fiscal year ended June 30, 1909, contains some interesting statistics recording the progress that has been made by the mines on the Rand during the year under review. The average working costs decreased 10.78 per cent., the average recovery decreased 8.3 per cent. and the average profit decreased 7.56 pence per ton or 4.67 per cent.

The reduction in recovery and working profit are offset by the longer life of the mines resulting from the working of lower-grade ore and by the gain in gross profits due to the enlarged scale of working. Dividends have increased 17 per cent. over the previous year. As regards the work done on the developing mines, figures are given showing a substantial increase of footage. With regard to the ores disclosed in the developing mines, the report, which may be taken to express the view of W. L. Honnold, the consulting engineer to the company, says that although different properties vary much as they do in the producing class, the situation on the whole continues reassuring. Particular attention is drawn to the favorable developments in the City Deep of the Central Rand and in the Brakpan mines in the far eastern section.

Regarding the future of the Rand the report says that this depends partly on the outlook for the deeper areas and partly on conditions affecting working costs. With regard to the former it may be said in a broad sense that payable conditions will continue to the limit of workable depths. One of the strongest arguments in favor of this view is the evidence of the Brakpan mines, where satisfactory conditions are being disclosed at a distance of 3½ miles from the outcrop as compared with 1½ miles—the deepest point reached—on the central Rand.

The tendency in the long run will be toward lower standards of working costs, lower, probably, in view of the longer period of sustained activity which may be reckoned on than one would now venture to suggest. Such improvements will chiefly be obtained by cheaper power and cheaper railway rates. The opinions expressed in this report have been quoted rather fully as they are the opinions of a prominent engineer, and on that account of special value. It has become too much the position for financiers in addressing their shareholders to usurp the functions of the engineer, and instead of dealing with the financial side of the business alone, to make forecasts of future production and profits and generally to deal with technical subjects which for proper treatment should be left to a responsible trained engineer or geologist.

Wooden Jig Grates in the Joplin District

By Otto Ruhl and Frank Sansom*

A jig grate made entirely of wood is receiving favor in the Joplin mining district. While this type has been in use for three or four years, in a crude form, it has only recently been perfected in construction and efficiency, so as to give promise of supplanting other jig-screen materials. It was originally designed and introduced for use in bad water, i.e., water strongly impregnated with sulphuric acid. In some mines the corrosive action is so strong that cast-iron jig grates are rendered unfit for use in two weeks' time.

Experimental Work

A great deal of experimenting was performed to determine what woods were best adapted to the requirements of the grate, and the most suitable form and method of construction. Yellow pine and cottonwood were found to be satisfactory for the main framework, as these were already in common use as frames and rests for other forms of grates and screens. But a much harder wood was required for the grate bars, and after trying all available hard wood, *bois d'arc*, common hedgewood or osage orange was found to wear longest, and to have the least expansion in water. Swelling of these bars would tend to close the spaces, and hence would be a serious objection. This wood is also particularly available since wire fences are supplanting the old hedge fences.

*Joplin, Mo.

Construction of Grate

Referring to the accompanying drawing the construction will be easily understood. The main framework *e* and *g* is simple in design and is made of pine or cottonwood. The grate bars *h* are V-shaped in cross-section, and fit snugly into notches sawed into the longitudinal timbers of the frame. To hold these bars firmly in place, the hickory cover strips *f*, slightly tapered in cross-section, being ⅞ in at the top, ¾ in. at the bottom and ¼ in. thick, are sunk into the upper surface of the grate bars, directly over the longitudinal timbers of the frame and fastened securely by means of brass screws countersunk. It will be noticed in referring to the table of variable dimensions, that for each given width of opening *b*, there are two dimensions *a* and *c*, the larger being used for rougher or large-size grates, say 36x48 in., while the smaller are used on the cleaning jig or smaller sizes. The jig grate is the invention of M. S. Robinson, of Galena, Kansas.

The grate bars are machine sawed to exact measurements, and the V-shaped notches in the frame are also spaced and sawed mechanically, insuring uniform width of opening. The improved grates are very compact and strong. They are easily put into place, being made to fit exactly the cell spaces of the various jigs used in this district.

Advantages of Wooden Grates

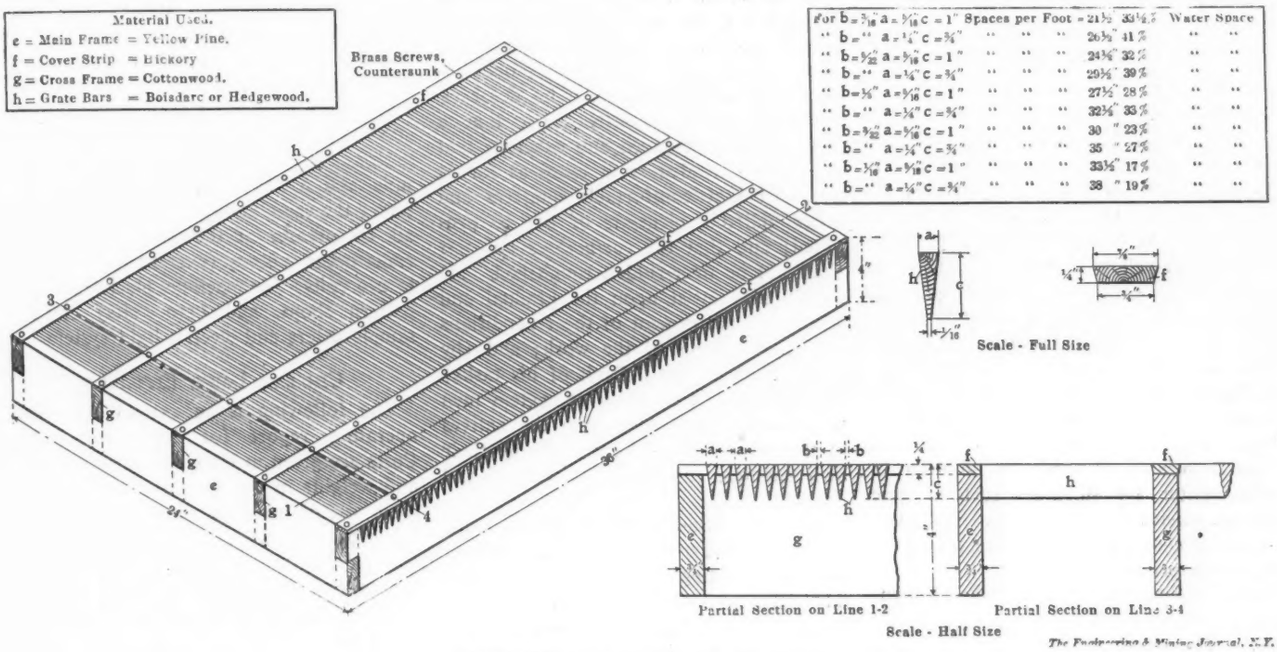
In addition to being acid-proof, these grates are said to have so many additional advantages that they are rapidly being introduced where the acid water has no especial effect on iron materials. Many points of superiority are claimed for the wooden grate. They wear longer than iron grates, wire cloth or perforated metal, not being attacked by rust and not requiring such frequent cleaning. There is not the difficulty from rusting which makes the particles cling to the iron and stop up the spaces. The iron grates, also due to the rough edges of the casting and rusting, rapidly clog, and at least twice a day must be "spudded," i.e., cleaned while in operation by means of a chisel-shaped iron bar. The wooden grates may go a week or a month without cleaning, which, however, can be done when necessary while in operation, by means of a steel knife inserted in the clots to remove clogging particles.

Capacity Increased

The slotted openings allow "flakey" particles to pass through easily. It is also claimed that the vibrating, springy action of the wooden grate bars, due to the pulsating action of the upward moving water, tends to keep the spaces free. The V-shaped bars offer the minimum resistance to the ascending water; and also the minimum opening of the water space being at the upper surface of the bars, all particles that enter the space will easily pass on through.

Cost of Grates

The wooden grates sell for $20 each, or per cell of jig, regardless of size, making the cost for a 5-cell rougher jig complete, $100. The cast-iron grates are sold by sections, 6 in. wide of any standard length. The price then of a complete 36x48-in. cell would be $8; for one 24x36 in., $6. However, in the Goodrich mine at Prosperity the cast-iron grates have to be renewed every two weeks or 26 times a year. At this rate a 36x48 cast-iron rougher grate


Material Used.
e = Main Frame = Yellow Pine.
f = Cover Strip = Hickory
g = Cross Frame = Cottonwood.
h = Grate Bars = Boisdarc or Hedgewood.
Brass Screws, Countersunk
Scale - Full Size
Partial Section on Line 1-2
Partial Section on Line 3-4
Scale - Half Size
The Engineering & Mining Journal, N.Y.

For b =	a =	c =	Spaces per Foot =	Water Space
1/16"	1/16"	1"	21½	33⅓ %
"	1/8"	3/4"	26⅔ "	41 %
1/22"	1/16"	1 "	24⅜ "	32 %
"	1/4"	3/4"	29½ "	39 %
1/16"	1/16"	1 "	27½ "	28 %
"	1/4"	3/4"	32½ "	33 %
1/22"	1/16"	1 "	30 "	23 %
"	1/4"	3/4"	35 "	27 %
1/16"	1/16"	1 "	33½ "	17 %
"	1/4"	3/4"	38 "	19 %

ROBINSON'S PATENT WOODEN JIG GRATE

would cost $208 per year, or the wooden grate, which is guaranteed for 8 to 12 months, and frequently lasts a couple of years, would be much more economical.

Comparison with wire cloth or perforated metal would not mean much for this district, for the square and round holes clog so badly that the iron grates are generally used. It would seem, however, that with the larger-size openings, say 3/16 or 3/32 in., where the water space is about equal to wire cloth and perforated metal, that if the wood grates last a year or over, and do require very little cleaning, they might be very economically used as the former types have to be cleaned every day and the cleaning is quite difficult. Wooden grates are now in use in nearly every camp in the Joplin district, over 16 of the principal mills having used them for periods up to three years

How to Recognize Pitchblende

By Herman Fleck*

Pitchblende occurs in fissure veins, in igneous rocks like granite. It is valued for its uranium and radium contents. It is not found in sedimentary rocks, although alteration products of it may be found therein. Such alteration products are colored yellow or greenish, and when in sufficient concentration and quantity, are valuable for their uranium contents. The radium value in these is small, as a rule.

Pitchblende is found in vein matter in stringers varying from knifeblade thickness to several inches. It is "bunchy." The associated minerals in addition to vein matter are sulphides such as zinc blende, galena, and iron pyrite. The latter usually predominates. It is detected by the following properties:

Color—Pitch black, velvety black, brownish sometimes with a grayish or greenish cast. The streak on rough porcelain, i.e., the edge of a broken plate, is brownish black, olive green, or grayish.

Luster—Dull, metallic, greasy, pitchlike.

Fracture—Conchoidal, that is, with smooth curved surfaces to uneven. Brittle.

Hardness—Less than quartz. It is not scratched by a knife blade unless weathered.

Specific Gravity—Heavier than iron or steel; also heavier than galena.

The following common minerals are likely to be mistaken for pitchblende by prospectors: Obsidian or volcanic glass, which differs from pitchblende in its lightness, glassy luster, and light streak. Magnetite, which differs from pitchblende mainly in that it is attracted by the magnet. Hematite, which differs from pitchblende mainly in possessing a red streak.

*Director, Colorado School of Mines, Golden, Colo.

Conditions and Costs at the Braden Copper Mines, Chile

By William Braden*

This paper is presented in the hope that it will be instructive in view of the future large expansion of the mining industry in the west-coast countries of South America. There is a more or less general impression that the Spanish-American workman is inferior to the American, but after some years of experience and observation I doubt the correctness of this view. Taking into consideration all the elements which make for efficiency of labor, it has been found, particularly in Chile, that under proper organization native labor yields as much, man for man, and more, dollar for dollar, than in the western United States.

If a manager is willing to accept unreservedly the *costumbres del pais,* without combating intelligently and patiently the ones tending to inefficiency, he should expect no better results than he deserves. He must conscientiously insist that a "square deal" be given and exacted; that liquor be excluded from camp as far as possible; that comfortable quarters and other uplifting elements of life be provided; and that the *costumbres del pais* shall not be over-ridden roughshod. He should also insist upon the gradual and reasonable adjustment of these conditions to the exigencies of the work; and (by no means the least difficult of his tasks) he should select the most competent men to patiently direct and teach the natives in the several departments, and by their own example encourage self-respect and decency.

While the Braden mine is by no means as yet operated on a large scale, according to modern rating, it will nevertheless be interesting to note what has actually been accomplished there. An illustrative description of the mines and mill of the Braden Copper Company has already been published.[1] However, in order to lend value to the figures given, the general conditions will be explained.

No Timbering Done

The copper deposit is a zone of mineralized, fractured and brecciated diorite, 150 ft. wide, lying under a hanging-wall of brecciated tuff, which has an approximate dip of 65 deg. The mine is dry and little or no drainage of any kind is necessary. The system of mining may be described as overhead mining on broken ore, in a series of transverse stopes, 10 m. wide, with intervening pillars 7 m. wide, which will be ultimately extracted by the caving system. The ore is moderately hard and the roof of stopes, 10 m. wide by 50 m. long, stands perfectly well without timbering. The only timbering in the mine is for the framing of the ore gates for extracting ore from the stopes.

The air drills, used to the fullest extent, are handled carefully and intelligently by the Chilean miners and the results have been so favorable that eventually hand drilling will be almost entirely supplanted. Rack-a-rock is the principal explosive used; but dynamite and black mining powder (the latter manufactured in Chile) are also used to a limited extent. The ore is trammed out of the mine through a main adit in one-ton cars by means of a three-phase electric haulage system (220 volts). It is then carried to the mill, 2630 m. distant and at 550 m. lower elevation, by two Riblet-system aërial tramways.

Water for the hydroelectric power is supplied through a flume, 30 in. wide by 20 in. high, and about 6000 ft. long, and a pipe line from 22 to 18 in. in diameter, which leads to three 42-in. Doble water wheels, two under 820-ft. head, and one under 840-ft. head, direct coupled to a 200-kw. 2200-volt alternating-current generator. Current is distributed about a mile and a half to one motor running under the same voltage, belted to drive an air compressor at the mine, and to various other motors (current transformed to 220 volts) for machine, blacksmith and pattern shops, and (110 volts) electric sample driers and electric-light system.

Chilean Labor Efficient

The following is an extract from the operating report for November, 1908. Costs are given in United States currency, and weights in dry tons of 2000 lb. The total cost of breaking 16,185 tons, including superintendence and general charges, was 41c. per ton. Upon the basis of 7304 tons extracted and milled, the costs per ton were distributed as per an accompanying table.

DISTRIBUTION OF COSTS PER TON.

Ore breaking	$0.31
General mine expense	0.06
Development	0.12
Underground tramming	0.02
Aërial tramming	0.06
Milling: Operation	0.27
Repairs (labor)	0.01
Repairs (materials)	0.09
General mill expense	0.05
Power	0.01
Sampling and assaying	0.05
General expense	0.23
Taxes, insurance and interest	0.04
	$1.32

The ore-breaking account includes much cutting-out for ore pockets, sub-crosscuts, raises, and other work of a preparatory nature. More than one-half the labor was performed by contract. In the stopes contracts were let on the basis of the number of feet of hole drilled. The actual cost of the labor for one month was as follows: 164 man-days (9 hr.), with 2¾-in. "New Ingersoll" air drills, drilled 5082 ft. at a cost of 2.025c. per ft. Aver-

*Mining engineer, New York.

Note—Paper read at the Spokane meeting of the American Institute of Mining Engineers, September, 1909.

[1]Eng. and Min. Journ., Dec. 7, 1907, pp. 1059-1062.

age amount drilled per man-day, 31 ft. 1008 man-days, by single-hand work, drilled 13,855 ft. at a cost of 8.2c. per ft. Average amount drilled per man per day, 13.8 ft.

Including all labor, both contractors and day-pay men employed for mining, there were 12 tons of ore broken per man-day. Since the above date a system of contracting for ore breaking by measurement of the ore broken has resulted in a considerable reduction of the cost for that item in the foregoing statement. Development was in the nature of drifts, crosscuts and upraises, with an average section of 4.53 sq.m., and, including all labor, supplies, explosives, mucking and tramming, the cost was $3.54 per ft. driven, or 78c. per cubic meter.

The amount of driving was 379 ft. with 876.75 man-days, making 13 ft. per month per man, or 0.433 ft. per day, and 1.96 cu.m. To give a concrete idea of what is considered to be good work, a contract was let for driving a main adit of a section of 6 sq.m. at a total cost of $3.15 per running ft. exclusive of drill-sharpening and repairs: 132.25 ft. were driven in 30 days. Payment of all labor accounts is made three times in each year, on Jan. 1, May 1, and Sept. 1. The workmen are permitted, however, to draw up to 80 per cent. of their balances at any given time—a custom of the country which leads to constancy of work and gives entire satisfaction. Wherever possible, a bonus is paid to encourage good steady work. The foregoing data indicate most conclusively the efficiency of Chilean labor.

According to the *Engineering News*, Oct. 14, 1909, the Panama canal excavation during September totaled 2,836,385 cu.yd., a daily average of 113,455 cu.yd. for the 25 working days, as against 2,755,178 cu.yd., a daily average of 105,969 cu.yd. for the 26 working days of August. The rainfall in September was 10.07 in. as against 9.28 in. in August.

A Portable Electric Air Compressor

An air compressor for special service is illustrated in the accompanying engravings. This machine is a complete electrically driven compressor outfit with motor, compressor and tank mounted on a truck. Such an equipment is a valuable adjunct to a mine for prospecting or other work in a part of the mine where the time and expense of laying a pipe line are not justifiable. Similarly, its uses at a prospect or where comparatively small amounts of work in different places are planned, are obvious.

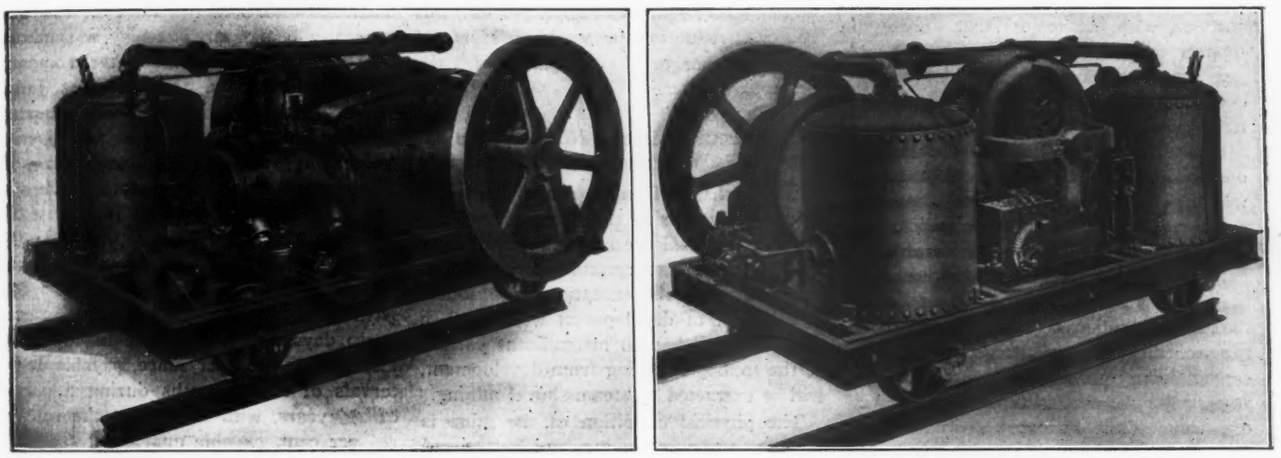
The compressor is of the standard single-stage type, made by the Sullivan Machinery Company, and the air cylinder is fitted with automatic poppet inlet and discharge valves, easily removable for inspection or cleaning. The air cylinder and heads are water-jacketed, the cooling water being supplied by a pump, mounted on the truck, and taking its power by chain and sprocket from the compressor crank shaft. This pump draws its water supply from any convenient source, usually tanks or barrels on a standard mine car. The air-inlet opening is covered with a screen to keep foreign substances from entering the air cylinder, and an unloading device is attached to this opening, arranged so as to shut off the supply of air, thus cutting down the amount of power used, whenever the air pressure in the receivers reaches the desired limit.

The motor is of the shunt-wound continuous-current pattern, and may be arranged for any desired voltage. It is fitted with a main-line switch and fuse connection, mounted on a slate base, and a starting rheostat, with the necessary wiring and connections between the two.

One compressor of this type, which has been built and supplied for coal-mining service, has a 10x12-in. air cylinder, furnishing about 175 ft. of free air per minute, at 150 r.p.m. The horsepower of the motor is 25, which easily maintains an air pressure of 80 lb. in the receiver. This capacity is ample to operate two small reciprocating rock drills or several hammer drills.

The air discharge from the compressor is delivered in series to two vertical receivers. Two receivers are employed, first, to keep down the hight of the machine, and second, because a single horizontal receiver would not permit the necessary compactness of arrangement, and the proper relation between the positions of the compressor and motor.

The motor and compressor are bolted firmly to a cast-iron sub-base, which, in turn, is bolted to a structural steel frame mounted on the trucks. In case a track is not available, wheels with wide tires may be substituted for those with flanges and the outfit hauled on the floor or ground.



PORTABLE ELECTRIC AIR COMPRESSOR

The record in loading iron ore has been made by the steamship "W. E. Corey" which took on 10,311 tons in 39 minutes at Two Harbors recently, according to the *Iron Trade Review*. The cargo had all been arranged for beforehand, 9311 gross tons of Pioneer ore having been placed in 33 pockets of the new steel ore dock, these pockets corresponding to the 33 hatches of the steamer, and the balance of 800 tons held in Summers ore cars over the pockets. The loading commenced at 2:17 p.m. and by 2:56 p.m. the 10,311 gross tons (mine weight) had been poured into her hold and the chutes raised to the dock. It required but 24 minutes to run the 9311 tons of ore that the pockets contained and the remaining time of 15 minutes was required in dumping 800 tons, or 18 cars. It will be noted that the "Corey" did not have to shift.

A correspondent states that the lake about three miles northwest of Oroville, Wash., supposed to be a borax deposit, has proved to be epsom salts. The lake is about 1000 ft. long and 200 ft. wide.

Utah Copper Quarterly Report

In the report of the Utah Copper Company for the third quarter of the current year, the executive committee states that the grade and character of the ores treated were somewhat improved during the quarter, the average copper content having increased to the extent of 1.15 lb. of copper per ton, notwithstanding that two of the steam shovels were worked most of the time in a low-grade portion of the orebody. Until about a year ago this part of the deposit was thought to be too low grade to be treated at a profit, but it has been found that on account of a slight improvement in grade and lower operating costs than previously expected, the company is now handling this material at a fair margin of profit. The character of the ore with respect to its amenability to concentration improved in greater proportion than did the value of the ore, with the results that during the quarter in question the average recovery per ton was increased over 1.75 lb. of copper, whereas the increase in copper content was only 1.15 lb. per ton.

Both reduction works continued in operation at approximately full capacity, with the exception that the Copperton mill in Bingham cañon was not in full operation during part of the months of July and August. The tonnage milled in the Garfield and Copperton plants during the third quarter was greater than that for the preceding quarter, the gross output of copper being 15,299,674 lb. as against 13,774,412 lb. About 100 tons more ore per day was milled during this quarter and this increased tonnage, together with the improvement in grade, accounts for an output of 1,100,000 lb. more copper than was contained in the ore treated during the previous quarter. The gross output of copper, however, was 1,525,262 lb. greater than during the second quarter, showing improved metallurgical results.

The total net profit for the third quarter was $721,683, of which $6095 was from rents, and the balance profit from mining and milling operations. At the close of the quarter, the company reports no copper unsold. In addition, all copper in transit and in process of treatment and refining which will become due for delivery up to Dec. 1 has also been sold.

Costs

The average net cost per lb. of copper produced at both plants, after deduction of smelting allowances, is given as 8.077c. as against 9.192c. per lb. for the second quarter, and 9.68c. per lb. for the first quarter. The report states that, considering the results of the Garfield plant alone, the net cost of the copper produced was 7.67c. per lb. The costs of milling at the Copperton plant are higher than those at the Garfield mill and always will be, but for the quarter under consideration this condition was magnified by the Copperton plant having run a portion of the time under short tonnage.

The Garfield mill produced over 90 per cent. of the total copper obtained, and the cost of the actual milling operation at the Garfield plant was slightly in excess of 47c. per ton; fixed and general charges increase these actual working costs by approximately 5c., so that the average total cost of milling at the Garfield plant was estimated at 52.16c. per dry ton. The average milling cost for both plants, including fixed and general charges, is given as 56.85c. per dry ton.

Actual mining of the ore at Bingham cost 15.39c. per ton. General expenses, together with development expense and the fixed charge per ton to retire prepaid stripping expense, amounted to 9.83c. per ton, making the total average cost of mining for the quarter 25.22c. per ton. The total average cost of mining and milling, including all general charges, development, maintenance, etc., was 82.07c. per ton, this being a reduction in working costs of nearly 9c. per ton as compared with the previous quarter.

Underground Mining Now Limited to Development

The tonnage of underground ore mined was reduced during the quarter to 14 per cent. of the total ore mined. At the close of the quarter, underground work was discontinued with the exception of a moderate amount of development work, and in the future all but an insignificant portion of the tonnage, coming from development, will be extracted by steam-shovel mining.

The physical condition of the mine is reported to be improving, and by the end of the year, it is expected that stripping will be so far advanced as to enable the company to produce ore of more nearly representative grade and character. During the last quarter, at least two-thirds of the output came from lower grade bodies on account of the better grade areas not having been completely stripped, so that a tonnage of clean ore could be secured from them.

Stripping operations continued throughout the quarter at an average rate of 151,000 cu.yd. per month, or a total of 453,000 for the quarter, equivalent to the complete stripping of about 4 acres of ground containing approximately 4,000,000 tons of ore. The average stripping cost per cu.yd. was 31.43c., this figure covering the entire cost of removal of capping, and transportation and disposition of it. The stripping charge, as explained in previous reports, is made against ore mined in such proportion that each ton shall bear its proper share of stripping cost, so that the entire cost of stripping is ultimately absorbed into operating cost. If the total expense of the stripping of 4,000,000 tons of ore had been charged against approximately 18 per cent. of that amount which was mined, the result would have been a mining cost of about 40c. per ton, a figure the company has not yet been able to reach by any other method than that of steam-shovel mining. Attention is directed to this feature in order to indicate the distinct advantage and economy that will accrue from being able to permanently discontinue underground mining.

Some delay was experienced during the quarter by the failure of the railroad company to give satisfactory service in the transport of ore, but several new and larger locomotives are shortly to be put in this service. This with proposed improvements in the road bed, has relieved the company of any serious apprehension in the matter of moving its products.

Dominion Steel Consolidation

The long controversy between the Dominion Iron and Steel and the Dominion Coal companies is to be settled by a practical consolidation, the stock of the Coal company being purchased by a syndicate representing the Dominion Steel company. In Montreal, Nov. 15, President James Ross, of the Dominion Coal Company, issued a statement that he had given a purchasing syndicate a 30-day option on his 50,000 shares common stock. The syndicate is composed of E. R. Wood and Sir Henry Pelleat, of Toronto, and W. M. Aitken and C. J. McCuaig, of Montreal. For his holdings Mr. Ross receives $95, payable as follows: $25 per share in cash in 30 days and the balance in 10 instalments of $7 each per share, payable at intervals of three months during a period of 2½ years, with interest at the rate of 4½ per cent. payable quarterly.

The sale is contingent upon other shareholders being permitted to accept similar terms, if they should desire to do so, by depositing the certificates for their shares within 30 days with the Royal Trust Company at Montreal, duly assigned and indorsed in blank. If at the end of 30 days the syndicate should fail to make satisfactory arrangements to purchase the shares so deposited on similar terms, Mr. Ross has the right to cancel the agreement for the sale of his own shares and to terminate the negotiations with the syndicate.

Within two days after the announcement holders of 70,000 additional shares of stock decided to come into the agreement, and it is believed that there will be no difficulty in securing the remaining 30,000 shares. When the stock has been transferred arrangements will be completed for the consolidation of the two companies. This is an important transaction, involving the merger of the largest iron and coal interests in eastern Canada, besides terminating the long and expensive litigation arising out of the contracts between the two companies.

The closing of this agreement has caused the circulation of many rumors. It is reported, for instance, that negotiations have been opened for the merger with the

Dominion companies of the Nova Scotia Steel Company and the Drummond interests in Quebec and Ontario; possibly also of the Lake Superior Corporation, with its steel works at the Sault Ste. Marie and its mines on the Mishipicoten range. So far, however, there is no positive confirmation of these reports, and they can be regarded only as indicating a possible result rather than one immediately probable.

The Calumet & Hecla

Will the Calumet & Hecla people come in? They will. They will not. They are receptive. They are not. Never was a rumor of a big copper deal without grave and altogether futile conjecture as to the attitude of the Calumet & Hecla interests. They are not in the least concerned. It is their business to produce and merchandize copper metal, and they attend to it strictly. It is the greatest of the older copper properties, and it is capitalized at the modest figure of $2,500,000. The shares are of the par value of $25 each, and in 20 years each share has received in dividends $750. The aggregate of dividend disbursements during 20 years has been $75,000,000, on a capitalization of $2,500,000. Why should the Calumet & Hecla ever "come in?" asks the *Evening Post.*

The New York Curb Market

The following notice was posted on the Curb bulletin Nov. 10:

"For the protection of the public complaints made in writing against any corporation or individual using the New York Curb market directly or indirectly will be investigated by the agency and referred to the proper authorities for suitable action.

E. S. MENDELS,
Agent."

In explaining the notice Mr. Mendels said: "What we want to do is to drive the rascals off the Curb. Unfortunately the prosecution of sharp dealers involves considerable hardship for the out-of-town complainant, as the district attorney in most cases desires a personal interview with those who allege fraud, while the law itself requires that warrants must be signed by those who swear them out. This new rule will give me something tangible to work on. When a writer makes a direct accusation of fraud I send out a form letter in which I offer to bring him on free to New York to press the charge, while if the complaint is only a general one of treatment received I send it to the broker whom it concerns as a reminder. This method of dealing with correspondence from writers who assert that they have been abused has been in fact a part of the Curb agency's policy right along, and it is now put down in black and white for the first time as a sort of guarantee that the agent is willing to move for the redress of any wrongs which are susceptible of proof."

Transvaal Stope Drill Competition

The accompanying table gives the results of the Transvaal stope-drill competition with simple averages of distances drilled and air consumption worked out. The pressures used were not uniform up to September, but during that month they were more closely regulated, varying from 69.1 lb. per sq.in. on the Siskol to 60.1 on the Holman.

	Inches per minute.	Free air per foot drilled.
CHERSEN.		
Elimination	4.110	239.9
June 17-22	3.27	310.4
July 26	3.74	252.0
Aug. 19-31	2.16	256.6
Sept. 21-29	3.523	281.9
Average	3.36	268.1
SISKOL.		
Elimination	4.46	202.4
June 17-22	2.59	362.5
July 21	3.00	321.2
July 26	2.85	397.4
Aug. 19-31	3.21	317.66
Sept. 21-29	4.00	216.2
Average	3.35	302.89
HOLMAN 2¾-INCH.		
Elimination	3.12	385.14
June 17-22	2.47	646.3
July 21-22	3.75	346.0
Aug. 19-31	2.898	325.6
Sept. 21-29	2.55	445.4
Average	2.957	429.688
CLIMAX IMPERIAL.		
Elimination	3.52	235.65
June 17-22	3.03	337.1
July 21	2.55	318.3
July 26	3.04	329.1
Aug. 19-31	2.44	445.3
Sept. 21-29	2.52	313.0
Average	2.85	329.74.
NEW CENTURY 00.		
Elimination	2.33	276.6
June 17-22	2.19	358.8
July 21-26	2.13	351.7
Aug. 19-31	2.77	253.3
Sept. 21-29	2.70	330.6
Average	2.424	314.2
HOLMAN 2⅛-INCH.		
Elimination	2.40	376.2
June 17-22	1.85	452.5
July 21-26	2.38	397.5
Aug. 19-31	2.33	285.5
Sept. 21-29	2.45	368.0
Average	2.282	375.94

The distance drilled is about the same for the Chersen and the Siskol, but the air consumption of the former was only 268 against 303. These are the only two drills which cut more than three inches per minute.

The Paper Trade

In mining-stock promotions of a particular sort the certainty of results is beautiful, says the perspicacious *Evening Post.* The public puts up the money, the promoter puts the money in his pocket, and the property (if there was one) is blandly forgotten. It is a regular business, with a vernacular of its own. The language is that of production; its meaning is subtraction. The promoters themselves conform to no type. They may be sleek and smug, or thin and silent, but all of them are very free spenders of other people's money. "Hello," says one, "What are you doing?" "I'm copper mining," says the other, "and what are you doing?" "I'm copper mining, too." "I thought you were silver mining?" "I was, but the Cobalt game got rotten." And the kind of mining they mean is mining the Curb market.

International Congress of Mining and Metallurgy

The next International Congress of mining, metallurgy, applied mechanics and practical geology will be held in the last week in June, 1910, at Düsseldorf, Germany, under the auspices of the Rhenish-Westphalian mining industry. This appointment is in pursuance of the action taken by the last International Congress, which was held in Liége, Belgium, in 1905. The work of the congress will be taken up in general and sectional meetings, and there will be visits to scientific institutions and industrial works. Inquiries for information should be addressed to the Committee of Organization of the International Congress, 3-5 Jacobistrasse, Düsseldorf, Germany. There are two presidents and two secretaries of the congress, representing respectively mining and metallurgy. For metallurgy, Friedrich Springorum is president, and E. Schrödter, secretary. They are president and secretary, respectively, of the Verein Deutscher Eisenhüttenleute. For mining, Bergrath Kleine, of Dortmund, is president, and Bergassessor von Loewenstein is secretary.

The mining section will consider groups of questions divided into nine heads, as follows: (1) Shaft sinking. (2) Methods of working and mine supports. (3) Hoisting and haulage. (4) Mine drainage. (5) Risks arising from firedamp, coal dust and underground fires. (6) The mechanical preparation of coal and ore. (7) Recent practice in mine surveying. (8) Statistics. (9) Sanitation and hygiene.

The program for the metallurgical section is included under six heads, as follows: A, Production of Pig Iron; B, Production of Malleable Iron; C, Iron and Steel Manufacture; D, Testing of Iron and Other Metals; E, Economics of the Iron Industry; F, Advances in the Metallurgy of Non-Ferrous Metals. In the section of applied mechanics topics will be considered relating to machinery used for mining and metallurgical purposes. Included among these are the subjects of blowing engines for blast furnaces and steel works, methods of driving rolling mills, central electric power stations, rolling mills and accessories and conveyers for mining and smelting work.

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November 13..... 9,500
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None sent free regularly, no back numbers. Figures are live, net circulation.

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Illustrated.

The Copper Deal

It seems that after all we are to have a big copper deal unless plans go wrong. The matter apparently is in charge of a power to which Wall Street doffs its hat in respect. No one knows yet what is going to happen; perhaps not even the power knows. Ideas as to who are concerned are clearer. Amalgamated, Cole & Ryan, and the Guggenheims are the interests which are to be brought together. The questions are how, when and where? We have heard a lot of guesses, but the conundrum is too deep for the ordinary mind. One thing is certain: Wall Street scents a deal that promises profit in the discounting thereof.

Connellsville Coke

The production of coke is so intimately connected with the iron and steel output that it furnishes an index to the course of those industries. This is especially the case in the Connellsville region in Pennsylvania, which supplies the blast furnaces and steel mills of Pittsburg and surrounding districts. The production of the coke ovens there is carefully compiled for each week by the Connellsville *Courier*, and from its statements is compiled the following table, which gives the average weekly tonnage made in each month of the current year:

January.....	265,205	June.....	308,600
February....	266,396	July.....	361,540
March.....	249,609	August.....	401,297
April.....	233,151	September...	423,062
May.....	265,040	October.....	439,559

The total production reported for the 10 months ended with October was 13,835,012 tons. For four months the output remained about at the level of 1907, even falling below it in March and April. In May it began to rise and from that on the increase was steady, until in October it reached a point even above that of 1906 and the earlier part of 1907. Thus far in November there has been a further gain. At the present time production is held down, not by any lack of demand, but by a short supply of labor. A large part of the men employed in the Connellsville field are foreigners, who are not held by any ties of property or association. In the lean times of 1908 many of them drifted away, some going into other occupations or fields, and some even returning to their native countries. Many have returned, but not all, now that there is a demand for their work. The operators are seeking to recruit their forces, and have promised that with the new year there will be advances in the wage scales to the level of 1907. This will involve an increase of about 15 per cent. in the wages now paid; but this is fully covered by the advance in the prices of coke which has been brought about by the increased demand.

The St. Paul Mine Accident

The accident at the St. Paul coal mine at Cherry, in the northern Illinois field, resulting in the loss of nearly 400 lives, appears from the telegraphic accounts to have been the result of an apparently trivial piece of carelessness—if any carelessness in a large coal mine can be called trivial. Until more definite accounts can be obtained, it is impossible to comment on the accident intelligently; but it seems probable that there was no great explosion of gas or dust. There may have been minor explosions, but they were the result of the fire which destroyed the approaches to the shaft and cut off the men in the mine from all chance of escape. In so large a mine it seems as if there should have been a second opening. Had one existed most of the loss of life could have been avoided.

As in nearly all such great accidents, there was a most commendable, though unavailing, display of heroic courage by the rescue parties. The nature of the accident made their efforts useless, but they were made as a forlorn hope and deserve praise accordingly. We hope to have soon a full account of the accident and its probable causes.

A Canadian Steel Merger

The purchase of the stock of the Dominion Coal Company by the Dominion Iron and Steel Company, noticed elsewhere, ends a long and costly litigation, and strengthens the position of the Steel company by giving it control of its fuel supply, which it has not heretofore held. The transaction has given rise to reports of an extensive merger, which is to include the Nova Scotia Steel Company, the Drummond interests in Quebec and Ontario, and the Lake Superior Corporation at the Sault Ste. Marie. Such a combination would hold even a stronger position in Canada than the Steel Corporation has

in the United States. Our Canadian neighbors seem to have taken to mergers and combinations lately; but it is at present impossible to say positively whether these reports are only surmises, or are based on actual negotiations. The most that can be said is that they forecast a result which is not at all improbable.

The Smelter Smoke Question

The persistent agitation of the farmers in California on the subject of smeltery fumes, particularly in Shasta county, indicates that this matter must receive definite attention from the managers of smelting plants in that section. Indeed they are keeping it prominently in mind. The closing of the smeltery of the Mountain Copper Company at Keswick, several years ago, caused that community to alter its attitude toward its smelting industry, but only after the plant had ceased operation. This method, while successful in abating the smoke, was unsatisfactory both to the smelting company and to the community, which afterward sought to have operations resumed. The situation in Utah is somewhat similar. Many of the farmers of the Salt Lake valley, after a bitter struggle to close the smelting works, are glad that their market will be partially restored by the modification of injunction obtained by the United States Smelting Company, which is now taking steps to construct a baghouse and extensive flue system preparatory to resuming the smelting of copper ores.

The overcoming of the fume difficulties, both in its lead and copper smelteries, by the neutralization of the acid gases and the baghousing of the fumes is a noteworthy technical achievement for the staff of the United States Smelting Company. Although the method is not of universal application, there are doubtless other smelting plants where conditions are sufficiently similar to permit an adoption of a modification of the method developed at Bingham Junction. The Mammoth Copper Mining Company is in fact now making plans to install a similar system at its works in Shasta county, California. Where there is a market for sulphuric acid and suitable ores are treated, as in Tennessee, the production of acid is undoubtedly the most profitable way of disposing of the smoke problem, but most smelting plants are situated where other methods must be devised.

California is now producing about 166,000 bbl. of petroleum daily, which is about 10,000 bbl. a day more than is being consumed, and it is estimated that there are about 18,000,000 bbl. in storage. Some of the oilfields, as for example, Coalinga, in Fresno county, are showing a reduced output, while others are increasing. The Santa Maria fields, in Santa Barbara county, are now yielding about 700,000 bbl. per month. Prospecting still continues in most fields, though the withdrawal of large tracts by the Secretary of the Interior is having some effect in preventing the posting of locations to hold oil lands. The lands withdrawn extend from Mount Diablo southeast several hundred miles and embrace almost all tracts that could possibly hold oil. Those who were drilling on public lands before the withdrawal of the lands consider themselves secure in their rights. There is doubt, however, of future results of this withdrawal where no discoveries had been made prior to the issue of order.

When the report of the United States Steel Corporation for the September quarter was published there was unfavorable comment because there the unfinished orders on the books showed less increase than had been expected. This, however, was hardly based on a knowledge of the facts. The total of unfinished orders is less than in some preceding quarters when business was not really as active as at the present time. The reason is that the corporation has restricted its contracts and has refused to accept two classes of orders, one being those running far into next year, and the other being orders from jobbers which partook of a speculative nature. The object of the corporation, apparently, has been to restrict that class of business and also to be in a position to take advantage of increasing demand by some advance in prices.

Comment has heretofore been made on the position of the Lehigh Coal and Navigation Company which owns what is practically the only large block of anthracite lands outside of the control of the roalroads. Some time ago nearly all the stock of the company was pooled in anticipation of a sale of the property. The transaction was not completed, and the pool then formed is now about to expire by its limitations. The managers, who are directors of the company, recommend that it be extended for five years more, though no negotiations are pending for a sale at present. They also recommend that the selling price be raised from $135, as by the present agreement, to $175 per share of $50 par value. Evidently they do not think that the value of anthracite mines and lands is depreciating.

The strike of the Amalgamated Association of Iron and Steel Workers which has been in progress since last July has thus far had no result. Agreements were made by the association with some independent producers, as was noted at the time, but the American Sheet and Tin Plate Company, against which the strike was chiefly directed, has remained firm in its support of the open shop. The latest development is that the company has commenced to dismantle two or three of its large union works which have been closed through the strike, and is removing the machinery to some of the other plants which have always been non-union.

Some of the difficulties attending coal-mine management in Pennsylvania, are shown by the statement in the latest report of the State Bureau of Industrial Statistics that 67.3 per cent. of the men employed in the coal mines in 1908 were of foreign birth. In the anthracite field there were 89,165 foreigners out of a total of 134,992; in the bituminous mines 92,295 out of 134,648. It is no easy task to handle this great mass of foreign labor and to enforce the observance of rules; especially as many of the men understand the English language imperfectly, or not at all.

A significant fact is that the official returns made in the principal steel-making countries this year for the first time give a separate line to steel made in the electric furnace. This is the case with Germany, France and the United States, although Great Britain has not yet followed the example. The quantities made, though still small, are appreciable, and the statistical authorities of the different countries have apparently been convinced that steel-making in the electric furnace has come to stay.

Views, Suggestions and Experiences of Readers

Comments on Questions Arising in Technical Practice and Debatable Points Suggested by Articles in the Journal

CORRESPONDENCE AND DISCUSSION

Working Costs

In the JOURNAL of Sept. 25, 1909, I noticed an article upon operating costs on the Rand, and the editorial remarks following. The article to which I refer emphasized the fact that relatively low per-ton costs are not necessarily coincident with the best commercial results. The editorial indorsed this view and recited its recognition by certain copper companies resulting in a change in their accounting methods to show costs per pound of copper instead of costs per ton of ore, in order to avoid the evil results of managers' efforts for per-ton cost records.

It is easily demonstrated that cost per unit of metal is quite as fallible a reference as cost per ton of ore, and as one of these references is almost invariably used by heads of mining corporations and directors of operations, in forming opinions of managers, of methods and of mining properties, it is most important that the opportunities for error in such practice should be understood. Some of the most important mining operators fail entirely to appreciate the unreliability of unit cost reference, and the use of this familiar touchstone is working damage to profit and loss accounts every day and injustice (both ways) to men responsible for results.

In order that a comparison of the efficiencies of two mining operations upon unit costs alone may be justified, two conditions are essential: (1) The economic and physical conditions must be identical; (2) the operating methods must be such as will show the maximum of profit when the orebodies shall have been exhausted. The first of these conditions is practically never met with, and the second is rarely attainable even with management of the highest order, incapable of seeking unit cost records at the expense of ultimate outcome.

It follows that in nearly all cases a unit cost difference between two operations should be regarded by managing directors as by the intelligent operator, simply as a signal for investigation and not as a basis for passing judgment. Experienced operators will agree that the comparative investigation indicated generally calls for the exercise of technical and business abilities of the highest order, whereas such matters are not infrequently referred to practical mining men who are "practical" only, to accountants or to business men, none of whom possess the scientific, practical and economic training required for the solution of a problem so complex.

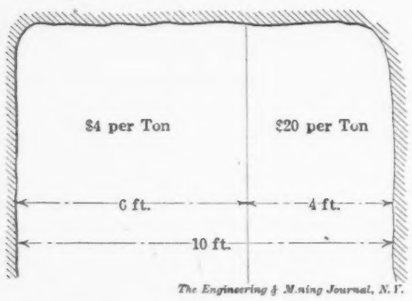
The accompanying sketches have been used by me in presenting this matter to directors. The sketches are designed to illustrate, in its simplest form, the fallacy of unqualified reference to unit costs, the same linear advance of stope back being assumed for each operator, and the figures representing revenue. Thus Black shows as operating cost $6 per ton and a total profit of $11; White shows as operating cost $7 per ton and a total profit of $13; Brown shows as operating cost $0.234 per oz. silver and a total profit of $17; Green shows as operating cost $0.175 per oz. silver and a total profit of $13. Black achieves low cost per ton by breaking ore which does not pay; Green achieves low cost per ounce of silver by leaving ore of low grade which would break to a profit.

What proportion of directors accustomed to per-ton costs would doubt that Black was White's superior in operating efficiency, and of those accustomed to unit of metal costs, what proportion would hesitate to declare Green a better manager than Brown?

These common errors of the heads of mining operations afford opportunity and temptation to managers to serve their reputations at the expense of the stockholders, and this very thing is being done every day on properties which are worked "to the books." *Per contra*, the operator who will not over-equip his mine, nor cut development work, nor designedly stope ore which does not carry itself, nor leave profitable ore of low grade, nor compromise in any fashion with his struggle for the unattainable final maximum of profit, will often suffer when his results are judged by unit costs alone. The treatment of the subject discussed suggests a similar simple demonstration of the unreliability of comparisons based upon current profit and loss results.

CORTLANDT E. PALMER.

NOV. 9, 1909.



BLACK'S MANAGEMENT:

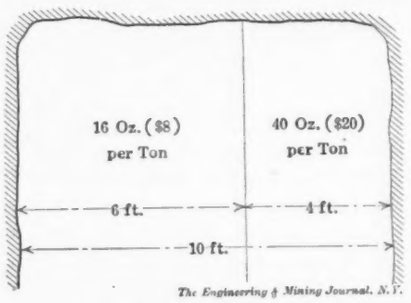
Average cost $6 per ton dry, breaking 10 ft. wide.

1	ton at	$20.00	= $20.00
1.5	ton at	4.00	= 6.00
2.5	ton at	10.40	= $26.00 revenue
2.5	ton at	6.00	= 15.00 cost
2.5	ton at	4.40	= $11.00 profit

WHITE'S MANAGEMENT:

Average cost $7 per ton dry, breaking 4 ft. wide.

1	ton at	$20.00	= $20.00 revenue
1	ton at	7.00	= 7.00 cost
1	ton at	13.00	= $13.00 profit



BROWN'S MANAGEMENT:

Average cost $6 per ton dry, breaking 10 ft. wide.

1	ton at 40	oz. = 40 oz.	= $20.00
1.5	ton at 16	oz. = 24 oz.	= 12.00
2.5	ton at 25.6 oz.	= 64 oz.	= $32.00 revenue
2.5	ton at $6		= 15.00 cost
2.5	ton at 25.6 oz.	= 64 oz.	= $17.00 profit

Cost per oz. silver = $15 ÷ 64 = $0.234.

GREEN'S MANAGEMENT:

Average cost $7 per ton dry, breaking 4 ft. wide.

1	ton at 40 oz.	= 40 oz.	= $20.00 revenue
1	ton at $7		= 7.00 cost
1	ton at 40 oz.		= $13.00 profit

Cost per oz. silver = $7 ÷ 40 = $0.175.

COMPARISON OF OPERATING COSTS AND PROFITS

Calumniating a City

There appeared in one of the New York papers on Sunday morning, Nov. 7, a lurid description of surface cavings in Scranton, Penn. From time to time there have been subsidences in the suburbs of Scranton over the extracted surface veins of anthracite coal. Some of these were comparatively serious. When a cave occurred in a populous neighborhood, some frame houses were wrenched from their foundations, some homes of more substantial materials, brick or stone, showed the violence of the subsidence by cracks and fissures. Those whose properties were injured by these dislocations of the surface were naturally loud

in their denunciations of the capitalistic greed that robbed the pillars under their small properties. I am not blaming them for being angry. They had a right to be angry. In my opinion the thing could have been prevented and ought to have been prevented by operating companies that were making relatively large profits out of the mines. I have said so in a former article in the JOURNAL, and I now repeat it. At the same time, the destruction alleged to be brought by caves was unconscionably exaggerated even by the local press. I said then and I say now, that a fire of even moderate dimensions in the heart of the cities of Scranton, Wilkes-Barre, Pittston or Carbondale, would be infinitely more destructive than the loss of property caused by the most serious subsidence that ever took place, or that will or can take place in these cities or in their immediate neighborhoods. The loss of property occasioned by the caves has been, I repeat, insignificant, and should be less so in the future with precautions that would cost comparatively little to put into effect. Something has already been effected in that way, and there seems to be a disposition on the part of the operators to undertake voluntarily a great deal more of it.

The article in the Sunday paper gave a mendacious account of the character of the subsidences that took place in West Scranton. In fact, nothing happened that is alleged to have happened there, except the fact that there were subsidences. But in a daily paper, one does not expect and one does not get scientific accuracy of details in matters of this kind. It is not the text of this outrageous article that has chagrined and disconcerted the people of Scranton. It is the abominable illustrations accompanying the article that has aroused the indignation of all, even of people whose homes have been more or less injured by the subsidences. These illustrations are not accurate or nearly accurate representations of the conditions of the district in which the caves took place, even at the time of the disaster.

For instance one of the photographs represents a house or barn toppling into a mine cave. Now, as a matter of fact, this picture is a photograph of a subsidence that took place over eight years ago in Olyphant, a borough six or seven miles as the crow flies from the city of Scranton. Another photograph has been faked in such a way that a subsidence of very small dimensions is represented as a section of a cemetery through which the tombstones and monuments are dashing into the yawning cavity that leads into the bowels of the mine. As a glance at the photograph will show, these toppling tombstones and monuments have been interpolated into the original photograph. Not an incident of the kind ever happened in Scranton, or within miles of it, if indeed, anything of the kind ever happened in the anthracite regions or elsewhere. I have made inquiries of the cemetery officials where this incident is represented to have taken place, and they assured me that not a coffin nor a corpse has left its resting place so far as they know of or could discover.

One of the photographs represents what appears, or at least what is stated to be a section of the tracks of a street railway. This is an abandoned section of temporary tracks on which small gondolas laden with ashes for an ash dump were dragged by a mule. If I am not mistaken, one of the photographs is placed on edge, so that a small cave appears in the paper as if it were a portal to an inferno. In another picture the pillars are represented as being almost a mile apart. Two-fifths of the coal in the anthracite mines in the Lackawanna valley is still in the pillars. Pillars are the residuum of the breasts, and there are thousands of them where this article represents them as having been "robbed."

One of the officers of a coal company said to me: "There is no truth in three-fourths of the asservations made in the article and the illustrations that accompany are monstrous perversions of the incidents that appeared superficially in the subsidences that took place in West Scranton. I was there shortly after they occurred, for our mines were affected, although our property was not directly under this section of the city. The situation looked appalling enough when the section affected stood in raw contrast to that which escaped. But even a superficial investigation showed that appearances were altogether deceptive, and that with the exception of a few homes that were thrown out of plumb and a few fissures in the earth, in reality nothing serious had happened or was likely to happen in that section. A public school was the only building that could not be restored to as good condition as ever for a few hundred dollars, for where a squeeze once occurs, it is a rare thing for another to take place there; the squeeze acts as a brace to the surrounding property. I do not wish to dwell on this, but what I do maintain is that while subsidences will occur over the worked-out superficial veins this caving will be on a small scale, and with some precautions on the part of the operators these should neither be frequent nor serious."

I was shown a telegram by Alderman W. S. Millar, of Scranton, which he received from his daughter on the morning following the publication of the article to which I refer. The young lady, who lives in Brooklyn, was evidently greatly disturbed when she wrote the despatch, for she anxiously inquired if her father's home was outside the zone of the subsidence, and whether her friends and family had been in any danger. The caving in West Scranton occurred three months ago, but this girl (a Scranton girl) read the article as if it were the immediate news of an awful catastrophe, something between an earthquake and a dynamite explosion. There is not the slightest doubt that thousands of other people, less likely to be informed upon the matter, read the article and appreciated the illustrations in the same light. It appears that people living in this city have received scores of communications inquiring into the extent of the disaster that has befallen or threatens the city, and these letters were written in good faith, but, of course, in complete ignorance of the situation.

The article is an outrage perpetrated against the people of a great industrial center and against the material reputation of the city itself. There is no excuse, much less a palliation for its publication. A telegram to any responsible citizen of Scranton would have set the editor of this Sunday supplement absolutely right on the situation in Scranton, and in the neighboring cities, if he had cared to learn the truth.

P. M. GREER.

Scranton, Nov. 10, 1909.

Copper Converter

Referring to Charles F. Shelby's article in the JOURNAL of Oct. 23, 1909, describing a modern type of barrel converter for copper matte, I wish to bring to the notice of readers of the JOURNAL that similar considerations led me to design a converter with spherical shell. An additional feature, more valuable than the increased life of the lining, is the arrangement of the tuyeres in such a manner as to generate a vortex in the fluid matte for the purpose of increasing the air efficiency in the copper converter, which at present is very low. This would result in a more rapid oxidation of the charge, hence a reduction of the time required for blowing. As a later development I intend to use a non-corrosive lining and feed silicious ores through the nose of the converter. This type of converter is covered by U. S. Pat. 832,665, of Oct. 9, 1906.

HERBERT HAAS.

San Francisco, Cal., Nov. 9, 1909.

A prospector in South Australia, according to *Bulletin* No. 8 of the Department of Intelligence, must mark his claims with a post at each corner. Each post must be not less than 3 in. square and 3 ft. high. It must bear the date of pegging, and the number of the miner's right by which it is held. From each post two trenches must be cut, pointing the direction of the boundary lines. The trench must be 3 ft. long 1 ft. wide and 6 in. deep. In rocky ground a wall of rock will serve the same purpose.

Details of Practical Mining

Notes of Interest to Prospectors and Operators of Small as Well as Large Mines. Things That Have to Be Done in Everyday Mining

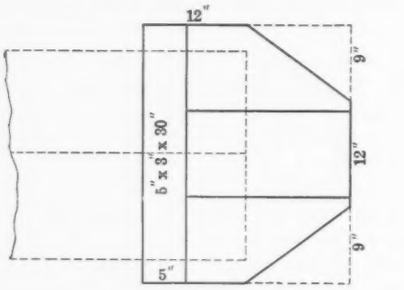
REPORTS FROM EXPERIENCE

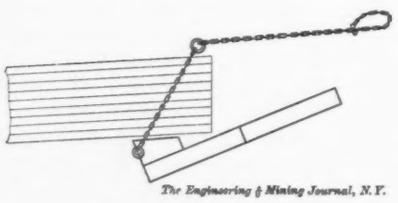
Readers of the JOURNAL are invited to contribute to this department. Articles should be brief, thoroughly practical, and preferably illustrated by drawings or sketches. Our draftsmen will prepare properly any kind of a pencil sketch that is intelligible. Something that is an old story in one district may be quite unknown in another. Articles accepted and published are suitably paid for.

A Scheme for Transporting Lumber

BY W. F. DU BOIS*

The accompanying illustration shows a contrivance that was very useful to me in transporting lumber. The wagon road ended ¾ of a mile from the mine where





A LUMBER "LIZARD"

I wished to put up an office and mine buildings. The slope from the end of the road to the mine was between 30 and 40 deg., so that it was impossible to go down with a wagon. The "lizard" used is 2½ ft. wide, 2 ft. long and made of 2-in. plank. On the top is a piece of pine 3x5 in., beveled so that it is 3 in. thick on the back and 1½ in. in front and spiked to the 2-in. plank with 20d. nails. The first planks or boards to be hauled are spiked on top of the 3x5-in. piece with 20d nails and the successive layers of boards nailed to each lower layer. After 18 or 20 boards, 18 ft. long were securely spiked, an ordinary 12-ft. log chain was put around the boards, back of the 3x5-in. plank. The end of the chain was fastened to a singletree by a grabhook. One horse could easily pull the load down the back of the ridge to the mine. On arriving at the mine the chain was thrown off and each board pried loose. The chain and singletree were hung on the harness and a boy carried the lizard as he rode the horse to the lumber pile after another load. The lizard lasted twelve loads. Four trips a day were made.

*Mining engineer, Quincy, Cal.

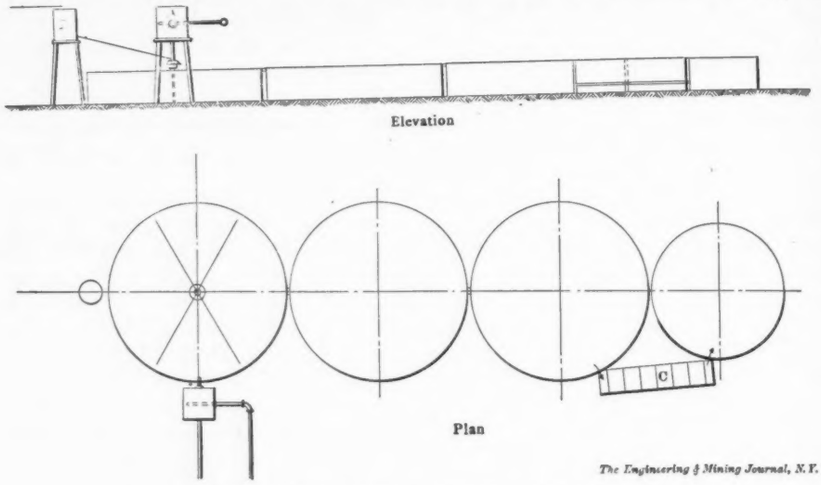
Stamp Drop Sequence

The order of stamp drop sometimes makes a great difference in the capacity of a stamp mill. At the Gold Cross mill of 100 stamps at Hedges, Cal., the drop of 1000-lb. stamps on rather friable ore was 1-4-2-3-5. This sequence gave an even splash, even distribution of ore on the dies and a good discharge. As an experiment, the drop of 10 of the 100 stamps was changed to the so-called standard drop, 1-3-5-2-4, with the result that the batterymen immediately complained. These 10 stamps gave more trouble than all the others together.

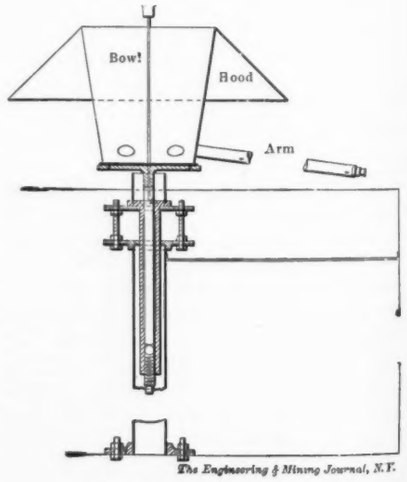
With the numerous modern cam fastenings, it is possible to try both drops by merely having the cam shafts drilled or flatted (as the case may be) for both sequences. This can be done by the manufacturer without the slightest injury to the shaft and at little or no expense. The change from one drop to another can then be made in two hours after the mill is built and it is desired to experiment with the second order of drop.

Water Softening

In many of the mining districts in Western Australia the only available water for boiler feed contains a large amount of scale-forming constituents. Gordon F. Dickson, in the *Journal* of the Chamber of Mines of Western Australia, Aug. 31, 1909, describes a process of water softening, and says that with a comparatively small expenditure a plant can be erected that will give excellent results.



GENERAL ARRANGEMENT OF WATER SOFTENING PLANT



DETAILS OF DISTRIBUTION

The accompanying plan shows the arrangement of a plant in use at the Northern mines, Lawlers. The chemical receiver *B* is capable of holding a supply of dilute chemical reagent, the flow from which is

regulated to last 24 hours. The first or separating tank is fitted with a central column in which is a spindle and bowl of the Butters automatic distributor type, and into this the hard water, after passing through the heater *A*, is delivered, where it mixes with the required quantity of solution fed from the chemical receiver *B*. The distributor has six arms, each perforated with a number of holes at equal distances and placed at an angle of 45 deg. below the center line of the pipe, through which the combined water and chemical solution is sprayed into the tank. The rapid circulating motion of the arms causes a certain agitation which allows of complete mixing, and quickly effects a separation of the solids.

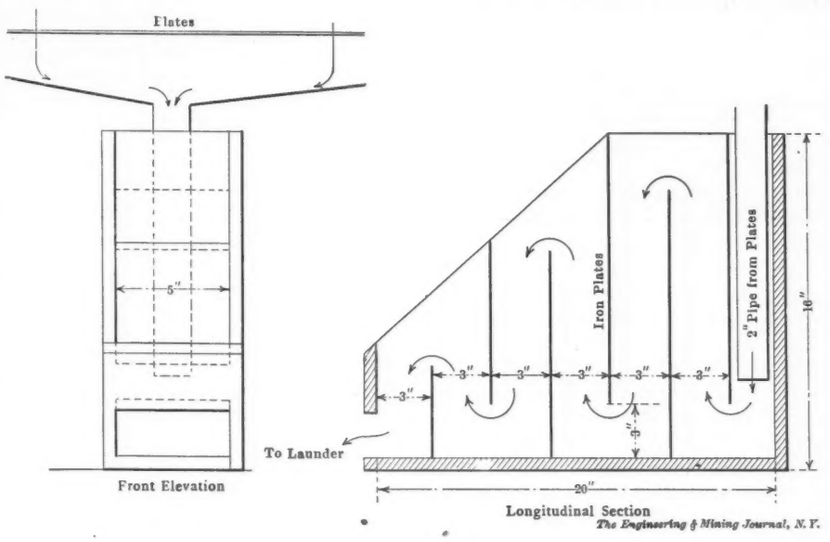
To provide for thoroughly cleansing the pipes of any adhering scale the ends of the distributor arms are fitted with ordinary screw plugs. By removing these daily, and passing a light iron rod through the pipes, the latter are kept perfectly clean. To prevent the water from getting on the bearing surfaces of the spindle and bowl, a hood is fitted around the top of the bowl, which carries off any water that might overflow and be liable to cause incrustation on the working parts. Besides the increase in temperature gained from passing the hard water through the heater *A*, exhaust steam is also led into the separating tank, and the temperature is further raised to 160 deg. F. This removes a percentage of the carbonates of lime and magnesia contained in the water, and further effects a complete blending of the chemical reagent with the hard water.

The water overflows from the first to the second tank, where the principal settlement takes place, thence to the third tank for further settlement, after which it passes through the filter *C*, where any of the precipitate that has passed the settling tanks is caught and any oil introduced with the exhaust steam is removed. The water before treatment contains 16 deg. total hardness, 5 of which are permanent and 11 temporary. After treatment, daily tests show the total hardness of the water to average less than 2 deg. Analysis of the water shows the following constituents in parts per 100,000: Organic and volatile (including CO_2), 6.07; silica, 7.81; ferric oxide and alumina, 3.63; calcium sulphate, 8.30; calcium carbonate, 4.57; magnesium carbonate, 9.40; sulphuric oxide, 1.80; chlorine, 7.32; total, 48.90.

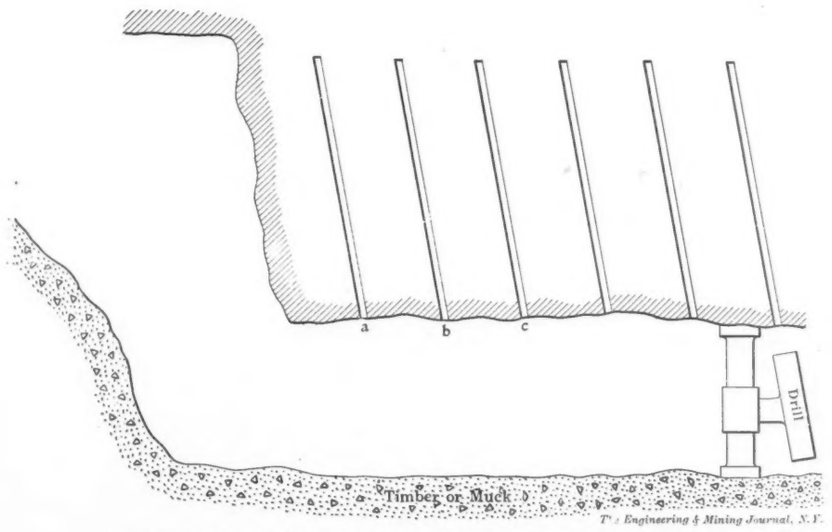
The softening of the water is effected by the addition of 10 lb. of caustic soda per 24 hours for 19,000 gal. of feed water. Samples of water taken from the flow entering the boiler-feed tank show, on analysis, only traces of lime and magnesia. The plant has been in operation for four months and, except for occasional stoppages to remove the accumulated precipitate from the tanks and the brief time required each day for cleaning the distributor arms, it has worked continuously and has given the utmost satisfaction, at a trivial cost for labor and maintenance.

An Amalgam Trap

A form of amalgam trap that is giving good satisfaction on sands heavy in sulphides at the Laurentian mill in Gold Rock, Ontario, is illustrated by the accompanying drawing. The baffles are iron plates, adjustable in hight above bottom of box, sliding in grooves cut in the wood sides of the box.



TRAP FOR COLLECTING AMALGAM



ARRANGEMENT OF HOLES FOR BLASTING WITHOUT REMOVING DRILL

A Method of Blasting in Stopes

The method of drilling and blasting used in many shrinkage stopes of California is worthy of far wider application than it receives. It can be employed in any stope where the muck from one round of holes is not depended upon to furnish a foundation for the bar or column for the next round. It may be used in either wide or narrow stopes.

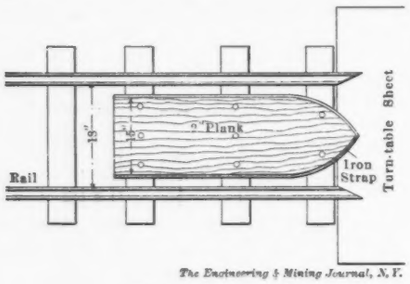
As in the accompanying illustration, only the rows of holes, *a b c*, are blasted, the remainder being left until the next shift. In this manner the machine is always well behind the shots and need never be torn down on account of blasting. It is torn down only when all the holes possible from the set-up have been drilled, and the troublesome and useless labor of carrying the drill and rig over timbers and muck in search of a safe place to leave it is avoided.

By this method there is no lost time on the part of the machine runner and the only drawback to the system is the fact

that the breaking powers of each hole will depend upon the efficiency of a number of unblasted holes before it. However, this argument has its foundation more upon fear than upon any real uncertainty a good miner feels regarding the breaking of his round.

Mining Track Frog

The cheap, simple but effective device shown in the accompanying figure is used in some of the Utah mines for guiding the

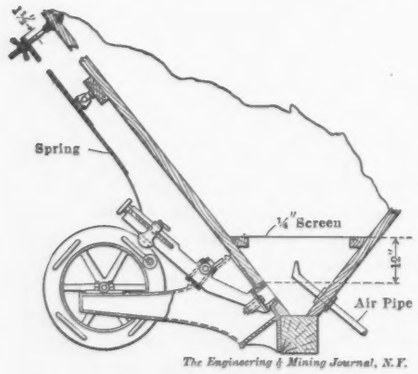


TRACK AND FROG

wheels of mine cars to the rails when passing from a smooth floor or, for example, from a turntable. It is composed of a piece of 2-in. plank, 15 in. wide (if used with 18-in. track) and 2½ ft. long. One end is cut into a rounding point and the edge of the plank is protected by a piece of strap iron, 2 in. wide, nailed on. The device is then spiked down between the ends of the rails, with the point toward the turning place, leaving enough space between the edges and the inner sides of the rails for the flanges of the wheels to pass. Unlike most other devices for this purpose, this contrivance does not get battered out of shape, does not require a blacksmith to make it, and never fails in its duty.

Lime Emulsion Feeder

A convenient and automatic scheme for feeding lime to a cyanide mill where it is



LIME EMULSION FEEDER

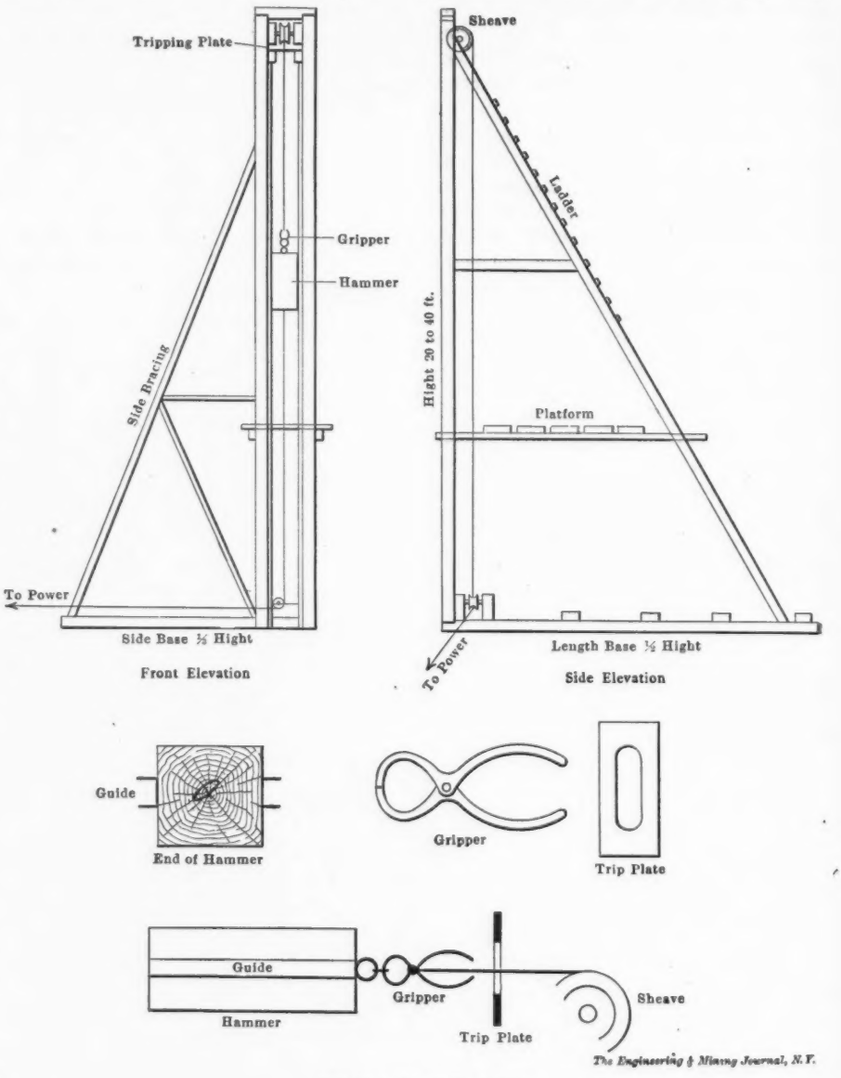
desired to add a continuous stream to a battery feed or discharge is illustrated in the accompanying sketch. Provide two conical-bottomed wood or iron tanks, each to have a capacity of 12 hours' supply of lime when diluted, 10 to 1, with water. The point of each tank is provided with a valve which is opened at intervals for short periods, being held shut at other times by a spring as shown. A tiny jet of air in the point of the tank will maintain the lime emulsion at a constant consistency.

The lime should be slaked in one tank (with hot water, of course, since this method gives much the best results), and then diluted while the other tank supplies the plant. The ¼-in. screen is provided in the cone to retain contaminating rock, which is in nearly all lime, and which cannot be discharged by the valve. Slaked lime, even if nearly dry, is provokingly difficult to feed in the required small quantities, as it arches and packs and fails to keep the feeder charged.

Selenium has been found in the mattes made from zinc-box precipitates of the Camp Bird mine, but is not detected in the ore.

A Homemade Pile Driver

The pile driver illustrated by the accompanying sketch may be entirely constructed at any camp, no matter how remote. It may be mounted on a scow or set up on runners in the usual manner. In cold countries it is generally used in winter when it can be set on the ice. A donkey engine or horsepower may be used; in either case the power may be applied from the shore if necessary. The



DETAILS OF PILE DRIVER

piles may be guided by wood frames built for the purpose, sliding in the guides.

When the hammer is raised, the curved arms of the gripper are engaged by the oval opening in the plate, thus forcing the points apart and releasing the hammer. After each blow, a man standing on the platform refastens the gripper to the ring on the hammer. The hammer consists of a pine block 4 ft. long by 16 to 18 in. square.

The sheave and bottom pulley may be of iron or merely blocks of wood, ground, working on a bar.

New Publications

LO ZINCO. By Roberto Musu-Boy. 3.50 lire. Ulrico Hoepli.

POCKET MANUAL OF THE ENGINEER'S SOLAR TRANSIT. 25c. Keuffel & Esser Company.

THE TIN FIELD OF NORTH DUNDAS. By L. K. Ward. John Vail, Government Printer.

NEVADA'S MINERAL RESOURCES. Compiled by E. E. Stuart. State Printing Office, Carson City.

CONCRETE. By John C. Trautwine, Jr., and John C. Trautwine, 3rd. John Wiley & Sons.

DIE SPEZIALSTAHLE IN THEORIE UND PRAXIS. By Walter Giesen. 3 marks. Craz & Gerlach.

ELEMENTS OF MACHINE DESIGN. By Dexter S. Kimball and John H. Barr. $3. John Wiley & Sons.

ALTERNATING CURRENT MOTORS. Third Edition. By A. S. McAllister. $3. McGraw-Hill Book Company.

A TEXT BOOK OF PHYSICS. Second Edition. Edited by A. Wilmer Duff. $2.75 P. Blakiston's Son & Co.

LES POUSSIERES DE HOUILLE. By J. Daniel. *Annales des Mines,* February, 1909. 3 fr. 50. H. Dunod and E. Pinat.

TRANSACTIONS OF THE AMERICAN INSTITUTE OF CHEMICAL ENGINEERS. Vol. I, 1908. D. Van Nostrand Company.

DIE KUPFERERZLAGERSTAETTEN IN NORDAMERIKA. By Leonhard Odendall. Kölner Verlagsanstait und Druckerei, A. G.

DIE ENTWICKLUNG DER DEUTSCHEN EISENINDUSTRIE IN DEN LETZTEN JAHREN. By F. Wüst. M. 1.50. Wilhelm Knapp.

FIFTH BIENNIAL REPORT OF NORTH DAKOTA GEOLOGICAL SURVEY. By A. G. Leonard, State Geologist. State Geological Survey.

ESTUDIOS JEOLOJICOS I TOPOGRAFICOS DEL DESIERTO I PUNA DE ATACAMA. By Lorenzo Sundt. Sociedad Nacional de Mineria.

IRON ORES, SALT AND SANDSTONES. W. Va. Geol. Sur., volume IV. By G. P. Grimsley. $2. I. C. White, State Geologist.

DIRECT AND ALTERNATING CURRENT TESTING. By Frederick Bedell, assisted by Clarence A. Pierce. $2. D. Van Nostrand Company.

THEORETICAL ELEMENTS OF ELECTRICAL ENGINEERING. By Charles P. Steinmetz. Third Edition. $4. McGraw-Hill Book Company.

TABLES AND OTHER DATA FOR ENGINEERS AND BUSINESS MEN. Compiled by Charles E. Ferris. 50c. University of Tennessee, Knoxville.

THE OFFICIAL YEAR BOOK OF NEW SOUTH WALES, 1907-1908. By John B. Trivett, Government Statistician. W. A. Gullick, Government Printer.

SECOND APPENDIX TO THE SIXTH EDITION OF DANA'S SYSTEM OF MINERALOGY. By Edward S. Dana and William E. Ford. $1.50. John Wiley & Sons.

LAVORAZIONE E TEMPERA DEGLI ACCIACI INDURIMENTO SUPERFICIALE DEL FERRO E CEMENTAZIONE. By Arturo Massenz. 2 lire. 1909: Ulrico Hoepli.

COLORADO GEOLOGICAL SURVEY: FIRST REPORT, 1908, with accompanying papers. By R. D. George, State Geologist. The Smith-Brooks Printing Company.

DIE HERSTELLUNG VON HOCHPROZENTIGEM FERROSILIZIUM IM ELEKTRISCHEN OFEN. By Waldemar Pick and Walter Conrad. M. 6.60. Wilhelm Knapp.

THE GEOLOGY OF THE MIKONUI SUBDIVISION, NORTH WESTLAND. N. Z. Geol. Surv., Bull. No. 6. By Percy G. Morgan. John Mackay, Government Printer.

THE GEOLOGY OF THE QUEENSTOWN SUBDIVISION, WESTERN OTAGO DIVISION. N. Z. Geol. Surv., Bull. No. 7. By James Park. John Mackay, Government Printer.

THE MANZANO GROUP OF THE RIO GRANDE VALLEY, NEW MEXICO. U. S.. Geol. Surv., Bulletin 389. By Willis T. Lee and George H. Girty. Government Printing Office.

PROCEEDINGS OF THE FIFTH ANNUAL CONVENTION OF THE NATIONAL ASSOCIATION OF CEMENT USERS. Volume V. Edited by the president. Published by the association.

THE ORE DEPOSITS OF SOUTH AFRICA. Part II. The Witwatersrand and Pilgrimsrest Goldfields and Similar Occurrences. By J. P. Johnson. Crosby Lockwood & Son.

THE PREVENTION OF INDUSTRIAL ACCIDENTS. No. 1—General Pamphlet. Prepared by Frank E. Law and William Newell. 25c. The Fidelity and Casualty Company of New York.

THE YAKUTAT BAY REGION. Physiography and Glacial Geology, by Ralph S. Tarr. Areal Geology, by Ralph S. Tarr and S. Butler. U. S. Geol. Surv., Professional Paper 64. Government Printing Office.

GEOLOGICAL REPORT UPON THE GOLD AND COPPER DEPOSITS OF THE PHILLIPS RIVER GOLDFIELD. By Harry P. Woodward. DESCRIPTION OF THE CRYSTALLINE ROCKS OF THE DISTRICT. By E. S. Simpson and L. Glauert. W. A. Geol. Surv., Bull. No. 25. Fred W. Simpson, Government Printer.

THE DEEPER GEOLOGY OF THE NETHERLANDS AND ADJACENT REGIONS, WITH SPECIAL REFERENCE TO THE LATEST BORINGS IN THE NETHERLANDS, BELGIUM AND WESTPHALIA. By W. A. J. M. Vanwaterschootvandergracht, with CONTRIBUTIONS ON THE FOSSIL FLORA, by W. Jongmans. 40 marks. Institute for the Geological Exploration of the Netherlands.

EIGHTEENTH ANNUAL REPORT OF THE BUREAU OF MINES, 1909. Vol. XVIII, Part I. By L. K. Cameron.

Contents: Statistical review; mines of Ontario; iron ranges of Hipigon district; iron range north of Round lake; Black Sturgeon iron region; Bog iron on English river; geology of Onaman iron range area; iron formation of Woman river area; Lake Abitibi area; Lake Ojibway; last of the great glacial lakes and classification and nomenclature of Ontario drift.

INDIANA: DEPARTMENT OF GEOLOGY AND NATURAL RESOURCES. Thirty-third annual report, 1908. By W. S. Blatchley, State Geologist. Office of the State Geologist.

Contents: The coal deposits of Indiana: a supplemental report to the one issued in 1898. Report of the State mining inspector for the year 1907. A soil survey of Dubois, Crawford and Perry counties. A soil survey of Daviess county. The petroleum industry in Indiana in 1908. Report of the State supervisor of natural gas for 1908. The stratigraphic and faunal relations of the Waldron fauna in southern Indiana. The mammals of Indiana.

SUGGESTED RULES FOR RECOVERING COAL MINES AFTER EXPLOSIONS AND FIRES. By W. E. Garforth, $1.50. D. Van Nostrand Co., New York.

This book is offered to the coal-mining public in the hope that the suggestions contained therein will prove of service in saving life, relieving suffering, recovering victims and restoring mines for regular work. The volume contains a detailed description of the plan followed in rescuing victims from the Altofts colliery, after the explosion at that mine. The author shows how the work of opening up the Altofts pit might have been rendered safer if the use of portable breathing apparatus had been known in 1886, as it is at the present day. The book is particularly valuable in that few writers have attempted to treat this subject in a complete and detailed manner. Among other subjects treated in the book are the following: Suggested precautions to be taken before an accident; appointment of emergency officials; preparation of mechanical and other special appliances, safety and electric lamps, etc.; ventilation, fan drift, separation doors, etc.; sections and plans of shafts and underground workings for the use of explorers; instructions to workmen, need of special knowledge and training for rescue work, and suggestions should men be entombed; equipment of rescue stations and requirements of the portable breathing apparatus—danger attending use of apparatus with untrained men.

Personal

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

P. McCardell recently returned to Kingman, Ariz., from a survey trip of 30 days.

E. C. Thurston sailed from New York, Nov. 6, on his way to Peru on professional business.

J. E. Spurr, of New York, was in Monte Cristo, Wash., recently, on professional business.

F. C. Fuchs, of Lima, Peru, is in the goldfields of southern Peru and expects to remain there until December.

Quincy A. Shaw has returned to Boston after an extended visit to the mines of the Lake district of Michigan.

Senator Simon Guggenheim has returned from Europe. Daniel Guggenheim has also returned from abroad.

H. W. Kane, a Gilpin county, Colo., operator, is making a business visit to Pittsburg and other Eastern points.

F. N. Flynn, of Globe, Ariz., has been appointed metallurgist to the Arizona Copper Company, Ltd., at Clifton, Arizona.

W. T. Cronkright, of Moundsville, W. Va., has been appointed receiver of the Bituminous Coal Company, of America.

Alexander Agassiz and his son Rudolph have returned to Boston after a visit to the Calumet & Hecla properties in Michigan.

Forbes Rickard, of Denver, has been making an examination of mining property in Gilpin county, Colo., in the interest of Eastern people.

William H. Warren, of Richmond, Va., has been chosen president of the Argus Gold Mining Company, operating in Fluvanna county, Virginia.

Foster Milliken, of New York, formerly president of Milliken Brothers, Inc., has severed his connection as assistant to the receivers of that company.

R. Beaumont, who is connected with the Consolidated Goldfields of South Africa, Ltd., has been visiting iron mines on the Mesabi range in Minnesota.

Thomas Kelshaw, recently with the Mill Creek colliery at Buck Mountain, Penn., has been appointed inspector of the Coxe collieries of the Lehigh Valley Coal Company.

G. W. Metcalf, formerly of Salt Lake City, Utah, has been appointed superintendent of the Mammoth Copper Company's smelting plant at Kennett, California.

Robert Linton, of Atwater, Linton & Atwater, has been appointed general superintendent of the Sierra Mining Company, with headquarters at Ocampo, Chihuahua, Mexico.

F. P. Jones has resigned his position as general manager of the Dominion Iron and Steel Company to become general manager of the recently organized Canada Cement Company.

W. B. Ramsdell, president of the Casados and Tenamache mining companies, is in Hostotipaquillo, Jalisco, Mexico, with a party of investors and capitalists from Chicago.

James Devlin, for years superintendent for the H. C. Frick Coke Company, at the Bessemer plant, near Mount Pleasant, Penn., has just returned from a four months' trip to Ireland.

Walter Unzicker is making an inspection trip to various cyanide camps in the southern part of Mexico. His address for the next month will be at the University Club, City of Mexico.

Herbert H. Taylor, for 10 years past with the New Kentucky Coal Company, has been elected president of the Taylor Coal Company, with mines in Williamson county, Ill., and office in Chicago.

W. L. Cooper, manager of Robert W. Hunt & Co.'s European business, sailed from New York, Nov. 10, returning to London after the completion of his annual business trip to the United States.

F. H. Harwood has resigned his position as coal-traffic manager of the Illinois Central railroad, to become vice-president and general manager of the New Kentucky Coal Company, with office in Chicago.

Edward McCool has been appointed superintendent of the Monongahela River Consolidated Coal and Coke Company's shops at West Monongahela, succeeding C. S. Davies, who is now master mechanic.

William Riggs has assumed charge of the Monongah mine of the Monongahela River Consolidated Coal and Coke Company, as superintendent, succeeding George W. Peterson, who is superintendent at the Bunola mines.

Warren Bogue, formerly manager of the Salt Lake branch of the Mine and Smelter Supply Company, has become purchasing agent for the Boston Consolidated Company, in place of A. R. Scott, who has resigned to attend to his private interests.

Governor Henderson, of the Yukon Territory, recently arrived at Ottawa, and reports that the quartz-mining industry is making progress. One mill is in operation and others will be installed next season and promising discoveries of ledges have been made.

Dr. Richard Moldenke, Watchung, N. J., secretary of the American Foundrymen's Association, who attended the Copenhagen meeting of the International Society for Testing Materials in September, returned home recently after an extended tour through Europe.

James White, who has been Dominion geographer since 1884, has been appointed secretary of the Canadian Commission on the Conservation of National Resources. R. E. Young, late Canadian superintendent of railway lands, succeeds to the position of Dominion geographer. Mr. Young has left for England to attend the International Geographical Congress to be held in London next month.

As the guests of Charles M. MacNeill, a party left Colorado Springs Nov. 6 for a three weeks' tour to inspect copper properties, including the Utah Copper at Bingham, Utah, the Ray Copper, at Kellerman, Ariz., and the Nevada Consolidated, at Ely, Nev. The party consists of Charles Robinson, of Boston; Charles Hayden, Henry M. Blackmer, K. R. Babbitt, A. Chester Beatty, J. G. Hopkins and J. P. Cobb, of New York; W. Hinckle-Smith and R. A. F. Penrose, of Philadelphia, and M. Ferlaud, of Paris, France, with Mr. MacNeill and his Colorado Springs associates.

Obituary

Thomas Greene Bush died suddenly at Birmingham, Ala., aged 62 years. He was born in Alabama and educated at the University of that State and the University of Mississippi. For some years he was in business at Mobile, but early became interested in the development of coal and iron in the State, and removed to Anniston, becoming president of the Woodstock Iron Company and later of the Shelby Iron Company. In 1898 he removed to Birmingham, and later became president of the Alabama Consolidated Coal and Iron Company. He retired from that company in 1905, but remained president of the Shelby Iron Company, the Coosa Pipe and Foundry Company and the Imperial Coal Company. For nearly two years also he was one of the receivers of the Southern Steel Company. Captain Bush, who earned his title by service in the Confederate Army, was highly esteemed by his associates, and by the men who worked under him. He was much interested in labor questions, and was a member of the Nobel Foundation Fund for the promotion of industrial peace, an appointment made by President Roosevelt.

Societies and Technical Schools

Mining and Metallurgical Society of America—The headquarters have been moved to the School of Mines, Columbia University, New York.

Practical Mining Captains' Association of the Mesabi Range—This association will hold its first annual meeting at Duluth, Minn., Nov. 27. The officers are: President, T. J. Nicholas, superintendent Mohawk mine, Aurora; vice-presidents, W. J. Sincock, C. M. Carr, Interstate Iron Company, Virginia, Minn.; secretary, J. R. Foyle, mining captain Albany mine, Hibbing, Minnesota.

Special Correspondence from Mining Centers

News of the Industry Reported by Special Representatives at San Francisco, Butte, Denver, Indianapolis, Salt Lake City, Goldfield and London

REVIEWS OF IMPORTANT EVENTS

San Francisco

Nov. 13—It is difficult to keep exact track of the rich developments being made in the mines of Alleghany, Sierra county, or even those at Forest, in the same county. This is an old mining region which has come into notice again within the last two years since the opening of the Tightner mine. After that, when attention was attracted to the district, and mine after mine was opened, one rich strike after another has occurred. The camp seems to be "making good" all along the line. Most, if not all, of the mines are opened by tunnel and it is no poor man's camp for this reason. A strike of unusually rich ore was recently made in the Sixteen-to-One mine. In the district several rich orebodies have been discovered in the quartz mines within two years and there are now mills running on the Red Star, Rainbow, El Dorado, Omega and Gold Canyon mines. Some of the mines have been sending specimen rock to the smeltery or crushing it in mortars. There would be more stamps dropping had not the water supply this year run short. The Tightner does not expect to cut its vein in the lower crosscut tunnel before Jan. 1. The Oriflamme has disclosed a new vein. The Twenty-one expects to strike its rich chimney soon and the Andy Fitz company is drifting on a 2-ft. vein of ribbon rock. A new mill is being built for the group of claims on Bear creek under bond to John Andrews.

The 10 years of litigation over the Harrison gulch townsite case in Shasta county, Cal., has come to an end at last by an amicable agreement between the Victor Power and Manufacturing Company, owning the Bonanza Mining Company's property, and the property owners of the town. The company obtained a patent for its mining claims which cover a good part of the townsite, and the large property owners have paid to the company a substantial consideration and taken a lease for five years at a nominal rental. The courts have sustained the contentions of the mining company, giving it ownership of the disputed townsite.

An interesting injunction suit is pending in the oil regions of Kern county, Cal., which will probably turn upon the question of whether the filing of a mineral claim on oil land gives the locator any preference right to possession in advance of the actual discovery of oil. If the negative is held, any number of persons may go upon the ground and explore for oil, the advantage resting only with the one who actually finds the oil first. A corporation called the National Oil and Gypsum Company has obtained a temporary injunction against certain individuals who entered upon the disputed ground and began to explore for oil. The company filed on the land in October, 1906, and in October, 1909, began to bore for oil. Then the other men came in and also began boring for oil on the same ground. A good many companies have taken up "gypsum claims" in order to hold oil ground and there is much complaint from the oil men in consequence.

The Standard Consolidated Mining Company, of Bodie, Cal., for years the largest producing mine in Mono county, has inaugurated a leasing system on its properties in addition to the usual work on company account. The hill on which the property of the company is located has many veins, and a number of them carry ores which 20 years or so ago were considered worthless, but which under present conditions will pay a profit.

E. C. Harder, of the United States Geological survey, has been making an examination of the iron-ore deposits in the Eagle mountains in the northern portion of Riverside county, Cal. These deposits cover an area of about eight miles in length and a mile and a half in width. The ore is of good grade but none of it has thus far been utilized. There are no railroads in that section, which is a very dry one, with much hot weather. Besides the main deposit there are other deposits not so rich.

It is estimated that the production of crude petroleum in California for the first nine months of 1909 is 42,195,950 bbl., an increase of about 9,000,000 bbl. over the corresponding time in the previous year. The storage has also increased by over 2,000,000 bbl. Contracts are now being made by the large companies for five years at 50c. per bbl., which seems to be considered a fair price by producers. The dividends for September by companies listed on the stock exchanges amounted to $533,875, making a total to date of $20,574,644, and this without counting the dividends of unlisted companies.

The Brunswick Mining Company, which has been operating in Nevada county for some years, is sinking a new shaft which is to reach a vertical depth of 1200 ft. It is at the opposite end of Grass Valley district from the Central shaft of the North Star mines and is expected to prove that the mineral zone of the district is not confined to a small area.

The Excelsior Water and Mining Company, holding lands and mines in Yuba, Placer and Nevada counties, is about to rehabilitate its entire system so as to bring it up to date. The system has been allowed to deteriorate in late years. Now a large rock and cement dam is being built on the South Yuba river below the Rome powerhouse to take the place of the old wood dam. After this the company's ditches will be improved. Ditches have recently been completed to carry water to the Golden Dream mine three miles below Pleasant Valley on the Yuba river. Ditches have also been built to carry water to the new venture at the Posey Canyon mine, near Rough and Ready, Nevada county. There are also other plans in view looking toward the extension of the water system.

It is common report that the Associated Oil Company has succeeded in making contracts with several companies in the Kern River oilfield to deliver oil for a period of five years at 50c. per bbl., which is less than the prevailing spot price of late. The producers seem to consider this a safe and fair price. This company is enlarging the pumping plants along the main pipe line from Mendota to Port Costa. An additional boiler and plunger pump will be placed at each station.

The Oro Fino quartz mine adjoining the Mt. Shasta four miles west of Shasta has been placed under bond to the Stauffer Chemical Company, of San Francisco.

Denver

Nov. 15—In the Cripple Creek district, vague rumors are being circulated as to a proposed sale of the Golden Cycle mine and mill for $12,000,000, the story being accompanied, as usual, by hints of a tremendously rich strike in the 1300 level. There are said to be 3300 miners now at work in the district, and that the Nov. 10 pay day gave them upward of $350,000. The Wild Horse mine is producing about 1000 tons per month, the ore running from $3.50 to $20 per ton in gold. The Gaylord mill, on Ironclad hill, and the Gold Issue mill, on Carbonate hill, are credited with a clean-up which gave two retorts worth $10,000. The Gaylord mill is on the Jerry Johnson company's estate, and this mine is credited with a production last month of 1200 tons of ore of an average of over $20 per ton, and 1000 tons of $3.50 ore, which it is claimed is being treated at a

profit in the company's mill. Edwin Gaylord is the lessee and manager. The Gold Issue mill is treating ore from the Midget mine, on Gold hill, and last month treated 2000 tons. Manager Doepke is in charge of the mill. The Strong mine, of Battle mountain, and under the business section of the town of Victor, is a close corporation, and has always been close-mouthed as to its production, but it is reported in the district that the monthly report to the stockholders states that during October, among other shipments, one car was shipped which returned $75,000, and another $68,000, i.e., 45 tons averaging $3177 per ton. The El Paso-Gold King, in Poverty gulch, is producing about 30 tons of ounce gold ore daily. It is under lease to Owen Roberts, and employs 45 miners. The Chicken Hawk, of the Katinka company, on Guyot hill, is sending out a carload of 1½-oz. gold ore per diem.

In the Silverton district, a large body of copper pyrite and galena, carrying gold and silver, is said to have been opened in the Tantallon vein of the Peerless San Juan Company, in Minnie gulch. The last quarterly report of the Camp Bird mine shows a gross production of $924,750 in gold.

In the Russell Gulch district of Gilpin county, a strike of very rich ore is reported in the Wellington mine of the King Bee company. It was made in a lateral from the Newhouse tunnel, at a depth of 1400 ft. below the surface. It is further stated that an average of 14 samples showed $174 per ton in gold and silver.

A third tunneling machine is to be given a working test in granite near Golden; this one is a battery of 48 drills, in point of fact. Vigorous advertising of the stock of this hitherto untried and unproved machine has been done, the chief burden of which was, "Hurry up and buy the stock now, as after the trial, it is sure to advance," or words to that effect. It is to be hoped for the sake of those who have already purchased this stock, and in the interests of tunnel driving generally, that the trial will prove the machine able to do all that has been claimed for it.

In the Georgetown district, the announcement is now made that the mill of the Western Metals Company will be ready to treat ore in 90 days. This is the first mill to be completed in Colorado under the "Malm" process, which is claimed to be eminently suited to the Georgetown district ores, many of which are lead-zinc intimately combined, and difficult of separation. In the words of the projectors, "this plant embodies the latest development suggested by the operation of the Heinze plant at Corbin, Montana, and similar plants in Canada, Mexico and Australia. The process is an adaptation of the chlorination principle in which the metals are converted to soluble chlorine salts, and which are taken up in a solution with water and thereafter precipitated separately, the recovery of gold, silver, lead and copper being the metallic forms. Zinc is recovered by electrolysis, as is also the chlorine used in the primary operation. Chlorine gas is produced by electrolysis of common salt, giving as a by-product caustic soda."

The companies in the Aspen district represented by D. R. C. Brown and those controlled by D. M. Hyman have united to sink the Free Silver shaft 200 ft. or more, to develop both properties at depth. The electrical equipment to take care of the heavy pumping is now being installed. This equipment will unwater all of the main claims of the valley portion of the district and will also relieve the claims on the higher ground from water and enable their resumption. The chief properties which will be affected by this drainage extend on the north from Middle Farm and on the south to Tourtelotte park and includes the following properties: Mineral Farm, Park-Regent, Bushwhacker, Johnson and Arkansas, Della S., Free Silver, Smuggler, Mollie Gibson, Argentum-Juniata, Aspen, Durant and the properties on West Aspen mountain, and also the Franklin, Deep Shaft, Trainor and probably as far as the Mary B. In the properties extending from the Park-Regent to the Durant there is known ore and the prospects for good production are promising. The territory in which is the Midnight and Little Annie mine will not be affected by the pumping. Frank Henry, who has been exploring for the Aspen contact, 14 miles north of Aspen, has cut it with the tunnel. The results have not yet been announced. Important results are reported on the south and in the Taylor park region. Galena ore has been found on Italian mountain and the Doctor and Levisa and other claims are looking better. At Ashcroft the Tam O'Shanter mine is being worked and several old properties between Aspen and Porphyry are operating. Generally the prospect is very encouraging for increased activity in the Aspen district.

The Georgetown Tunnel Company has increased its capitalization from 1,000,000 to 5,000,000 shares of $5 each. A tunnel is being driven into Columbia mountain, and it is stated that contracts have been obtained from the owners of over 70 mines, in which they agree to prosecute work through the tunnel when their veins shall have been intersected. If the owners do not work their veins, the Tunnel company reserves the right to do so on a royalty basis. If this tunnel should be continued to 16,000 ft., as now projected, all the early great producing veins of Columbia, Democrat and Republican mountains will be intersected at depths varying from 500 to 2000 ft. This is the tunnel in which the much advertised Sigafoos rock-boring machine was installed, and ordered withdrawn after having been proved a failure.

A suit has been brought in the United States circuit court by English people against B. Stanley Revett, manager of the Reliance Gold Dredging Company, of Breckenridge, in Summit county, and C. W. Franklin, attorney. An accounting is asked for by the plaintiffs from the defendants as to how $43,000 of the former's money has been spent. It was subscribed for the purchase of claims and equipment of the same with machinery.

Butte

Nov. 13—Butte Coalition has declared a quarterly dividend of 25c. per share due Dec. 1. This is the first dividend declared since December, 1907, when a dividend of 15c. per share was paid. While the extensive development work and surface improvements which have taken place at the Coalition properties during the last two years have necessitated the expenditure of considerable money, yet it is a general belief that the company is at present in a position to pay considerably more than the dividend just declared and it is thought that a comfortable surplus is being created. Practically all the dead work of improvements has been done, and the company's Rarus, Tramway and Minnie Healey mines are now in good shape and should steadily increase their production, which at present averages about 1600 tons per day.

The long drift connecting the shafts of the Amalgamated company's Mountain View and West Colusa mines on the 1800-ft. levels was completed last week. The distance from shaft to shaft is about three-quarters of a mile. The drift was run for ventilation purposes and also for conveying the mine water from the Mountain View to the West Colusa and from there to the Leonard where it will be pumped to the surface. At the West Colusa mine the ore bins are being rebuilt and enlarged. Breaking ground for a new electric substation near the Anaconda mine was begun last week. This station will supply the power for all the air compressors used in the Amalgamated mines. At the Badger State the shaft is now down 1405 ft. A station has been cut on the 1300-ft. level and crosscuts started north and south.

At the Gagnon mine, the new three-compartment perpendicular shaft is down nearly 300 ft. It will be continued to the 2200-ft. level, which is the same depth as the present incline shaft now in use. With the recently discovered increase in grade of the ore deposits on the lower levels of the Gagnon, the management decided that the present hoisting facilities were insufficient. The ore is now hoisted through the incline shaft by means of 3-ton skips and the engine is of an old pattern, making it impossible to hoist over 800 tons per day. With the new perpendicular shaft and a modern hoisting engine the output may be easily increased to from 1200 to 1500 tons. The

fire at the Anaconda mine is under better control now than for some months previous. The ore from the upper levels is hoisted from the Anaconda shaft and approximates about 240 tons per day. The ore mined from below the 800-ft. level, amounting to about 500 tons daily, is hoisted through the shafts of the adjoining St. Lawrence and Never Sweat mines.

Salt Lake City

Nov. 13—The affairs of the Newhouse Mines and Smelters company seem to be in a fair way to be straightened out and work at the mines and mill resumed. The assets of the company have been purchased by the Trust Company of America at foreclosure sale for $500,000. The South Utah Mines and Smelters has been formed under the laws of Maine with a total capitalization of $4,300,000 to own and operate the former assets of the Newhouse company under a reorganization. Of this capitalization $1,300,000 will be in 6 per cent. income bonds convertible into stock at $5, the par value. Of the 600,000 shares of capital stock 260,000 shares will be reserved for the bond conversion. For the purposes of this re-organization 558,332 shares of the Newhouse Mines and Smelters stock was exchanged for the new and $1,272,000 in bonds of the old company were also deposited.

A recent special meeting of the stockholders of the American Flag Mining Company of Park City, 90 per cent. of the stock represented, voted unanimously to re-incorporate the company under Nevada laws and to increase the capitalization from 500,000 to 1,000,000 shares, par value $1. The entire increase of stock is to be treasury stock and is to be used in retiring the outstanding bonds, in paying for the Constellation group recently purchased, and in raising money for development.

Bingham is producing more ore than ever before in its history and the Denver & Rio Grande has purchased new equipment to handle the output which goes to Garfield at the rate of a train every two hours. Besides new steel ore cars, this equipment consists of eight new Mallet compound locomotives, each three times as powerful as any of the locomotives now in use.

At the annual meeting of the East Tintic Development Company at Provo M. M Kellogg and Ralph Kellogg headed contending factions for the control of certain policies of the company. A compromise was affected by which neither will go on the board but Ralph Kellogg retains his position as manager of the mines. No further trouble is expected.

Jesse Knight, of Provo has been in Ely, with engineers and is reported to have taken over the controlling interest in the Carbonate Ely Copper Company for the avowed purpose of supplying sufficient ore to enable him to reopen the Tintic smeltery which has recently closed. The Salt Lake smelters secured long-time contracts with the mines which supplied the Tintic plant. The Carbonate Ely is capitalized for $1,000,000 and was organized two years ago to operate in Sawmill cañon, 35 miles south of Ely. The group consists of 14 claims and the copper ore carries gold and silver.

Cobalt

Nov. 15—The recent break in La Rose still excites much interest, and there is a good deal of criticism of the new board of directors. The president, Mr. McGibbon, states that he is satisfied that with a greater outlay for development work and progressive management, the situation would soon right itself. The heavy shipments from this property are still being continued, and as the Muggley concentrator will shortly be in a position to treat the La Rose dump at the rate of about 100 tons a day, this will be an additional source of revenue to the company. The report of the management states that the ore reserves amount to about five million ounces, which would probably net nearly two million dollars. Among the properties of the consolidation which are reported to be looking better are the Princess and University, but the latter at the present time is unable to be worked on account of the lack of power.

The developments at the Buffalo mine have shown that the cyanide process as applied to the slimes has been entirely successful, and as a result during the coming week a shipment of about 30,000 oz. of bullion will be made. So far the mill has been running considerably under its capacity, but it has been demonstrated that the saving by the cyanide plant has been about 5000 oz. a month. The consumption of cyanide has been much less than was expected, amounting to only about four pounds per ton of ore treated. The mill is now running by electric power brought from Hound chutes, and the capacity will be much greater.

Toronto

Nov. 15—An important improvement in the navigation of the Montreal river will be begun this winter. A retaining wall or dam will be built at Latchford, which will raise the level of the river 12 ft. covering Park rapids with navigable water. By some additional work Flat rapids can also be obliterated, and a clear stretch of navigable waterway obtained extending 40 miles from Latchford to Mountain Chutes. The dam will be composed of concrete 300x12 ft. and will cost $80,000. A large amount of freight is going up the river this season. There are 12 steamers on the route as compared with four last year, and they are unable to handle the traffic as large accumulations of freight are at Latchford awaiting shipment. Owing to the high cost of handling at three portages the rate from Latchford to Elk City is $1 per 100 lb. The projected improvements are expected to reduce this by one-half.

Contrary to an announcement recently made, it is now stated officially by the Public Works department of Ontario that the new provincial road from Elk Lake to Gowganda will be completed this month. Railway construction on the branch of the Canadian Northern in Ontario between Sudbury and Port Arthur is proceeding rapidly, and will make Gowganda more accessible. A station to be named Gowganda Junction, situated about 30 miles northwest of Sellwood, to be opened before Dec. 1, will be the present terminus of the line, and a good road for wagons and sleighs is being cut through to Gowganda proper—distant 40 miles. This will shorten the haul by team considerably.

A strong agitation is on foot among those interested in the Elk Lake, Gowganda, Maple Mountain and other silver-mining camps lying west of Cobalt for the extension of the Temiskaming & Northern Ontario railway into that district. When the matter was recently urged upon Hon. Frank Cochrane, Ontario minister of mines, he replied that when the mines showed what they could do in the way of ore shipments the government would be able to determine the question. The mine owners have concluded to make a practical demonstration of the need of transportation facilities, by making shipments to the smelters of about 30 carloads of ore of a minimum value of 1000 oz. to the ton, as soon as the winter roads are in condition. The ore in some cases will have to be teamed 50 miles before it can be loaded on the cars. The camps interested are expected to contribute as follows: Maple Mountain, two carloads; Elk Lake and Silver Lake, 13 carloads; Miller Lake, eight carloads, and Gowganda Ridge, nine carloads. A number of other mines not included in the above estimate may also be represented. It is estimated that last winter the sums paid for freighting in getting in machinery supplies, etc., for Elk Lake and Gowganda amounted to not less than $1,000,000. In the Montreal River and Gowganda mining divisions upward of 9000 claims have been recorded and the traffic of the approaching winter in forwarding plants, materials and supplies is likely to be fully equal to that of last season.

The new government peat-briquetting plant, designed by Swedish engineers, has been installed at Alfred, Prescott county, by Dr. Eugene Haanel, Canadian director of mines. It will be in full operation next year and about 300 men will be employed in connection with the work.

Increased development in mineral production in the Fort McMurray district is expected as soon as the Edmonton & Great Waterways railway, connecting Edmonton with Fort McMurray, is completed. The railway is being undertaken with a provincial subsidy of $20,000 per mile, and is expected to be finished in two or three

years. In addition to gas and oil products table salt will be obtained from the rich deposits there, and a great potassium industry is among the possibilities.

The provincial-government officials have have succeeded in extinguishing the fire at the gas well at Pelican Portage which had been burning for 13 years.

Mexico

Nov. 14—Alfredo E. Rodriguez, of Saltillo, Coah., manager of the famous Cigarrera mine in Chihuahua, is reported to be investigating the possibilities of a zinc smeltery at Torreon, or at the coal-fields of Sabinas, Coah. Mr. Rodriguez is a prominent capitalist of the northern part of the republic, also a member of Congress from Coahuila, and if the project is found to be favorable, substantial support from the government would be given as well as assistance from prominent financial interests in Mexico City. The highest production of zinc ore was in 1907, which amounted to practically 100,000 tons exported to the United States and about 15,000 tons shipped abroad. Any advantage in the way of reduced freight rates or absence of duty would increase the production materially, and it seems to be merely a question of costs of smelting and marketing the product.

The better rates obtained for silicious ores has been the cause of the opening up of at least one mine in the immediate neighborhood of Durango. The Lucia Mining Company (lately the San Luis Mining Company), of Panuco de Coronado, Gabriel, have in the last two months opened up the San Gonzalo and San Luis mines and are shipping a carload of ore per day; this is picked ore, the second-class ore is at the present time being dumped, awaiting the installation of a new concentration and cyanide plant which the company hopes to erect in a short time. The management is in the hands of W. Thomas Moore, formerly assistant manager to the San Luis Mining Company.

Work on the railway to the timber lands west of Durango is to begin in November; when once started it is hoped that the line may be continued to Mazatlan. What may be looked upon as a hopeful sign is that a large contract has been let to the Pearsons for the making and deepening of the present harbor of Mazatlan. The line to the timber lands will be constructed by the National Railway Company and the interest on the money expended will be guaranteed by the state government and Compañia Maderera.

The mines of Zomelohuacan, at Las Minas, state of Vera Cruz, and owned by the Compania Minera Franco-Mexicano, have been closed since the recent death of William Vogel, manager. A re-arrangement of the affairs of the company is underway and it will probably be some time before operations are resumed.

Development work is being continued at the mines of the Teziutlan Copper Company, and a large tonnage of high-grade copper ore is being blocked out. The 300-ton smeltery, one of the best equipped in Mexico, is ready to be blown in, but no definite time for the resumption of operations has been set.

Paris

Nov. 6—With the holiday period ended, there are now signs of a revival of the mining business. The first part of 1909 was unsatisfactory as regards the location and financing of new enterprises. However, during the year the existing companies in which the Paris public is interested have done fairly well. The Compagnie Française des Mines de Bor operating a copper property in Servia has obtained excellent results. The net profit was about $300,000 on a capital of only $1,200,000. The production of blister copper in 1908 was 3300 tons, and the company will produce for 1909, 5000 tons. The production at the present time is very nearly 400 tons of copper per month. The cost ranges between $180 and $200 per ton. The 36x200-in. water-jacket furnace erected this year is now in full blast, and is giving good results.

Explorations for gold deposits in France have been continued during the year at numerous places near La Lucette, where a prospect is being explored by Chappee et Fils, manufacturers of Le Mans. Near La Bellière at Montrevault, much work has been done by the Consolidated Goldfields of South Africa under the direction of Harold Macandrew. The most important undertaking is in the central part of France, where the Société de Recherches Minieres Française is developing two new mines granted by the government and has made application for other properties at Montebras, where a company is working a tin property, two low-grade gold veins were discovered in connection with tin deposits, which yielded from 2 to 7 grams of gold per metric ton. Work is now being done to ascertain their value. The Montebras company is under the same management as La Bellière and Ste. de Recherches Minères Française. The latter company reports that it has milled in 1908, 45,460 metric tons of ore, yielding 313 kg. of fine gold by amalgamation. The ore is now entirely treated by amalgamation and cyanidation with a recovery of over 90 per cent. The capacity of the mill has been more than doubled and is now yielding 260 tons daily. This resulted from an addition of thirty 1500-lb. stamps to the forty 1050-lb. stamps already used. The company is expected to produce $90,000 of gold per month.

The dredge built for the Société du Sparwin (Maroni) is for use in Guiana. It is now erected and is being towed to the property from St. Laurent du Maroni, where it was built with the aid of convict labor.

The 25-stamp mill of the Mines de l'Andavakoere in Madagascar was started Sept. 1 and is in successful operation. The production of gold by the natives from grinding rocks and panning for September was nearly 220 kg.—a record. In two years these mines have produced 2½ metric tons of gold without any machinery. Official results of the stamp mill are awaited with interest.

London

Nov. 8—The prospectus has been issued of a new company called the Amalgamated Zinc (De Bavay's), Limited, formed to acquire the business and undertaking of De Bavay's Treatment Company, Ltd. The capital of the company is £500,000 in £1 shares, of which 250,000 will be allotted, fully paid, to the vendors, 122,500 are offered for subscription, and 122,500 are held in reserve. The company acquires the De Bavay patents for separating by flotation parts of the constituents of ores and other solid bodies from the remainder thereof, as well as mills, plant and machinery, and a large dump tonnage at Broken Hill. The contracts taken over include agreements for the sale of concentrates produced by the company for the next 10 years, as follows: For 1910 to 1912, 90,000 tons per annum; for the following seven years, 70,000 tons per annum.

Regarding past results the prospectus states that for the six months ended June 30, 1909, 47,370 tons of tailings of an average grade of 18.3 per cent. zinc, 3.7 per cent. lead and 3.4 oz. silver, were treated for a production of 14,646 tons of zinc concentrates assaying 48.6 per cent. zinc, 6.1 per cent. lead and 5.8 oz. silver; and 256.5 tons of lead concentrates assaying 13.8 per cent. zinc, 54.6 per cent. lead, and 23.4 oz. silver. With spelter at £21 12s. 1d. the profit was £17,427. On a production of 100,000 tons of zinc concentrates the annual profit expected is from £139,000 to £145,000.

A new mill, which will cost £100,000, is now in course of erection and will have a capacity of from 6000 to 7000 tons of tailings per week. This mill is expected to be completed about March or April. It is reported that the new issue has been fully subscribed.

A colliery explosion, in which 26 men lost their lives, occurred recently at the Darran colliery, near Bargoed, South Wales. The disaster was exceptionally distressing owing to loss of five members of the rescue party whose self-sacrificing heroism has stirred the feelings of the public. The rescuers who were overcome by afterdamp were William Bowen, general manager; David Lewis, under manager; William Edwards, contractor; David Morgan, overman, and Gomer Griffiths, overman. The mine does not appear to have been equipped with respiratory apparatus, and it is perhaps due to this neglect that the lives of so many brave men were sacrificed.

Mining News from All Parts of the World

New Enterprises, Installations of New Machinery, Development of Mines and Transfers of Property Reported by Special Correspondents

THE CURRENT HISTORY OF MINING

Arizona

COHISE COUNTY

Wolverine & Arizona—Work on the drift through the Warren into the Georgia claim has failed to disclose any orebody, and has been discontinued. The future work will be on the orebody in the main tunnel and connecting it with the Uncle Sam workings of the Copper Queen for an outlet for the ore. Much of the exploration work for the past year has been paid for by ore shipped, but an assessment is planned for future work.

MOHAVE COUNTY

Tennessee—The property at Chloride will be unwatered and operations resumed at the mine and mill. A zinc-ore-treatment plant will be installed. James H. Hurin is in charge.

YUMA COUNTY

Clara Consolidated—George Mitchell, president of the company, announces that the railroad from Bouse to Swansea will be completed by Dec. 1, and that the smeltery may be blown in on Christmas day.

PIMA COUNTY

Imperial—The October copper output was between 600,000 and 700,000 lb., a small decrease.

YUMA COUNTY

Cove—This group owned by Amos Adams is under bond to a New York company. It is in the Castle Dome district, in which district there is a decided revival of activity.

YAVAPAI COUNTY

Arkansas & Arizona—The company is prospecting its property near Jerome with diamond drills.

California

AMADOR COUNTY

Fremont Consolidated—At this property, Drytown, 80 men are employed, and the 40 stamps are crushing about 6000 tons monthly.

BUTTE COUNTY

Bills—On this mine at Kanaka peak, Doctor Burke, the owner, is running three tunnels. A pulverizer is to be put in to crush the low-grade rock.

CALAVERAS COUNTY

Ariel—In this mine, Mokelumne hill, John Casey has cut a lead of good ore in the tunnel.

Blue Bell—The mine near Glencoe will be reopened by F. M. Stern, C. H. Willey and W. D. Stewart, of San José.

EL DORADO COUNTY

Stuckslager—This mine at Lotus is being reopened by W. B. McKenney, of Sacramento.

INYO COUNTY

With the cessation of work at the Greenwater-Death Valley mine the once thriving camp becomes deserted. The orebodies at the 1000-ft. level were so small that further development was not considered advisable.

Skidoo—This company continues to ship bullion and the mine workings are in a better grade of ore than usual.

Casa Diablo—The electric-power plant of this company has been started.

NEVADA COUNTY

Pittsburg—At this Nevada City mine the 10-stamp mill is running steadily.

Zeibright—P. H. Patrick, leasing this mine in Bear valley, has 15 men at work and the mill is running.

Rough and Ready—This mine, at the town of the same name, is under bond to H. M. Black, who is arranging for a mill.

Gold Mound—It is expected that E. I. Field, of Denver, president of the company, will give orders to resume work on this mine at Grass Valley.

SIERRA COUNTY

Omega—This gravel mine at Forest, W. G. Sharwood, manager, is yielding large nuggets, some of them over $200. The ordinary pay gravel runs from $10 to $12 per ton, and the mill is crushing 100 tons per day.

Sherman—This quartz mine at Alleghany, R. H. Case, manager, has struck a rich shoot in the tunnel. The mine was recently started.

California—The gravel mine near Howland flat has been bonded to George Roderig and George Helmrich, of Davenport, Iowa.

Rock Creek—At this mine, Forest, owned by Elmer Mott and M. Morrison, work has been started. It is thought that this mine will tap the same channel as the old Bald Mountain Extension Company.

Amethyst—The ore struck in the mine at Forest runs high in rich sulphurets.

TUOLUMNE COUNTY

Tarantula—Machinery has been ordered. T. J. Russell, manager.

Mangante—This property at Jamestown is being developed by the Central Mother Lode Mining Company.

Colorado

CLEAR CREEK AND GILPIN COUNTIES

Seven-Thirty—The shaft, which is 1000 ft. deep, and which, with its drifts, contains 500,000 cu.ft. of water, has been tapped by a drill hole driven from the top of an upraise from the Burleigh tunnel, about 1500 ft. from its portal. This historic mine has produced several millions, but has been long idle, owing to the water. Work will now be resumed. The manager is G. W. Tarkington.

LAKE COUNTY—LEADVILLE

Progressive—This mine, on Canterbury hill, is reported to have struck 8 ft. of ore which assays 155 oz. silver and 57 per cent. lead.

SAN JUAN DISTRICT

The Gold King is being rapidly put in shape to operate again under full capacity by the new manager, Charles Gagner. At the Gold Prince, 40 stamps are dropping and large amounts of rich concentrates and crude ore are being sent to the smeltery, under the management of J. O. Campbell. The Hercules mine, which suspended operations during the railroad blockade, is dropping its stamps again and producing its usual amount of gold and concentrates, under the new manager, Walter H. Bunce.

Forty eight cars of concentrates were shipped from Ouray in October. This and the shipments from the Genesee and San Antonio from Red mountains represent for Ouray county an output of about 15,000 tons for the month.

Tomboy—The October crushing was 8500 tons yielding bullion, $47,500, and concentrates, $19,700. The expenses were $41,500, leaving $25,700 profit.

Boston & Silverton—This property, at Silverton, including the 100-ton mill, has been purchased by the W. B. Lowe Mining Company. The same company also controls the Arpad mine and mill on King Solomon mountain and the Silverton smeltery.

TELLER COUNTY—CRIPPLE CREEK DISTRICT

Trilby—The report to the stockholders shows $750,000 worth of ore developed and awaiting treatment in the mill now in successful operation. Ore is expected at 1500 ft. to which the shaft will be sunk.

Jo Dandy and New Haven—The companies have compromised the suit over trespass and will consolidate.

Abe Lincoln—The monthly output will be increased from the 300- and 400-ft. levels. John Sharpe is lessee.

Idaho

BONNER COUNTY

Idaho Smelting and Refining Company—The company plans to be in full operation by Jan. 1, now that the receiver has been discharged. Machine roasters and an additional furnace will be installed. J. Herbert Anderson is manager.

COEUR D'ALENE DISTRICT

Paragon Consolidated—The Chicago tunnel, near Murray, now in 1500 ft., will be continued.

Ambergris—Work has been resumed on this mine at Burke. H. L. Day, owner of the Hercules, is in control.

Snowstorm Extension—At a special stockholders' meeting it was decided to transfer the holdings to a company to be organized by A. J. Richardson and James L. Brice, of Los Angeles, who will effect a consolidation with other properties in the district and with a copper mine in San Bernardino county, California.

Rex—A Duluth company will operate the property on a 15 per cent. royalty and will sink a shaft 500 feet.

Jack Waite—The property has been sold to Patrick Burke, of Murray.

Illinois

An explosion in the mine of the St. Paul Coal Company, at Cherry, Bureau county, on Nov. 13, resulted in a large loss of life at present undetermined, but certainly between 300 and 400. The entrance was sealed in hopes of extinguishing the fire, but on reopening it to take up the work of rescue the fire was renewed and the recovery of those in the mine was entirely prevented, although heroic attempts were made. The fire is reported to have originated in the mine stable where some hay became ignited from an open torch, which was being used while the electric-light system was being repaired.

Indiana

BLACKFORD COUNTY

Five new oil wells were completed in this field during the last week.

PIKE COUNTY

Two oil wells were completed in the Oakland district during the week. Both are producers and will aggregate 130 bbl. per day. The first shipment of oil was made from this district Nov. 8, the new switches having been completed by the Ohio Oil Company. Thirty-one drilling rigs are now in the field and others will be brought in at once.

Kansas

Ihlseng-Ping—This mine in the Galena camp has finally got its shaft into the ore and has started a drift at the 275-ft. level with a 30-ft. face of ore in the drift. The shaft will be sunk through the ore to the 300-ft. level when a 60-ft. face will be carried. The two mills have been started and each will be of 400 tons capacity and be built together near the three-compartment shaft. A central power plant will supply electric power to the mill. A. O. Ihlseng, of Joplin, Mo., is manager.

Baxter-Quapaw—The new mill being built on the old Mission mine is rapidly nearing completion and the mine is being placed in shape to furnish the necessary production.

Kentucky

CARTER COUNTY

Deer Creek Coal Company—This company at Morehead is completing plans for the development of 3000 acres. The construction will be in charge of W. J. Von Borries of the Harris Engineering Company, Louisville.

PIKE COUNTY

Mitchell Coke Company—Work has been begun on a battery of coke ovens at Hellier. This is the first attempt to make coke in the Marrowbone field.

Michigan

COPPER

Lake—A mill test at the Franklin mill yielded 60 lb. of copper per ton of rock stamped. The rock came from the third level and from the face of the drift.

Superior—A compressor has been delivered. Shipments of 325 tons are being made daily to the mill and this will be increased to 600 tons. The rock continues to yield about 25 lb. per ton. No. 1 shaft is sinking below the twelfth level.

Franklin—The enlarged hoisting plant at No. 1 Pewabic shaft has gone into commission.

Wyandot—Drifting on the amygdaloid lode, recently exposed in the crosscut from the 700-ft. level continues. The drift to the north is showing encouraging results, but the south side is carrying little copper.

Hancock—No. 2 shaft is down 2100 ft. bottomed in trap streaked with copper which is believed to indicate proximity to the sought No. 3 lode. Work on the enlargement of the surface equipment is progressing satisfactorily.

Laurium—Sinking has been resumed. About 100 ft. has been reached and good ground is being exposed.

King Phillips—No. 2 shaft has reached the fourteenth level and has opened some fine ground. No. 2 shaft is below the seventh level and is opening good stamp rock in the lateral openings. This property will be ready for regular shipments upon the completion of the mill which is being erected jointly with the Winona company.

Quincy—Several air blasts, caused by the caving of ground in old workings of No. 6 shaft caused a temporary shut down of No. 2 shaft.

Victoria—The management denies any intention of closing the mill, as five years' ore reserves are developed.

IRON

Traders—This mine at Antoine lake, Menominee range, will ship 90,000 tons this season. Development work will be continued during the winter.

Holmes—The Buffalo & Susquehanna company is exploring this property in section 6-43-32 near Crystal Falls.

Negaunee—Three old-time iron mines near Nagaunee will resume operations. They are the Milwaukee and Davis mines, controlled by the Breitung interests, and the Lucy, under contract to the Cleveland Cliffs company.

Missouri

LEAD AND ZINC DISTRICT

Ohio Valley—This company, operating the new mine south of the Wilson at Spring City, W. H. Hancock, manager, has completed the mill. This mine has developed ore below the regular blanket formation.

Puritan—This mine on the land of the Old Dominion company, near Joplin, has finished sinking for the lower ore run.

MADISON COUNTY

Madison Land and Lead Company—On account of failure to pay interest due on bonded indebtedness, this company has passed into the hands of a receiver. The bonds amount to about $400,000, and there are other debts amounting to nearly $100,000. Appraisers are at work, and their report will be ready for publication in the near future. The company has a 500-ton mill, and mineral lands at Fredericktown, Missouri.

Montana

BROADWATER COUNTY

Black Friday—William Bennett is the owner of this property in the Radersburg district. A 1000-ft. drift is being run on the 400-ft. level. The drift is now in 235 ft., and of this 179 ft. is in ore.

JEFFERSON COUNTY

B. & G.—R. A. Bell, the owner of the property, six miles from Alhambra, has cut a 2-ft. vein in the shaft at 30 ft. The shaft will be sunk to 200 ft., and an 1100-ft. tunnel run to cut the vein.

Golden West—At a meeting of directors the following officers were elected: Gus Hadel, president; D. W. McIntyre, vice-president; R. M. Ostranich, treasurer, and F. A. Lenz, secretary. The company has purchased 10 quartz-vein claims in the Cardwell district, four miles northeast of Whitehall. Several tunnels have been run.

Minneapolis-Corbin—The shaft is now down 250 ft., and the work of cutting a station at that point has begun.

LINCOLN COUNTY

Provo—A strike has been made on the

300-ft. level. Two feet of lead-carbonate-silver ore has been exposed, and the vein has not yet been fully uncovered.

MISSOULA COUNTY

Big Elk—In the upper tunnel there has been encountered a 3-ft. vein of copper ore.

Monitor—Shipments have been begun from the 700-ft. level. It is the intention to sink the shaft to 1000 ft. A delay in shipment has been caused by installing a new pumping plant.

Nevada

ESMERALDA COUNTY—GOLDFIELD

The Goldfield Consolidated Company, joining with other companies in the district, has asked the court for an injunction restraining the local assayers from purchasing any ore or ore products without first giving due notice to the companies. The proceeding is attracting much attention.

Goldfield Consolidated—During October the Consolidated mill treated 20,100 tons, an average of 680 per day, which returned a net profit of $580,000. This is the largest profit in any one month since May, and is accounted for by the discoveries in the Clermont shaft, where ore of excellent milling grade was mined during the entire month.

ESMERALDA COUNTY—RAWHIDE

King-Heisner—The directors have decided to put in an additional 20-stamp mill to supplement the present mill using Huntingtons.

Mint Lease—The shaft is down 450 ft., and is sinking to 1000 ft. The high-grade ore is being shipped to Hazen.

LYON COUNTY

Overland—The shaft at this mine at Silver City will be sunk from 700 ft. to 800 ft. J. W. Phillips is superintendent.

NYE COUNTY

Mayflower-Pioneer—The shaft at Pioneer has reached 210 ft., and is being sunk. Jack Aylwood is manager.

Bullfrog National Bank—E. Boyd, former superintendent of this property at Rhyolite, has secured a lease on it, and will start work.

NYE COUNTY—ROUND MOUNTAIN

Round Mountain—Nov. 2 there was filed an application in court by the Round Mountain-Red Top Mining Company and the Round Mountain Sphinx Mining Company requesting that they be allowed to make an underground survey of the Round Mountain mine. The district judge took the matter under advisement. The president of the Round Mountain company stated that the company had been careful to act within its property rights.

Round Mountain-Blue Jacket—Morgan, Stovelt & Cook leasing upon this acreage have made the first shipment to the mill of the Toquima company.

Round Mountain Combination—Holland & Meehan leasing from this company have made a 150-ton shipment to the Toquima mill.

Toquima—The mill of this company is treating some custom ore, but the reserves of the mine are sufficient to keep the mill running for the winter, and the future policy of the company will be to do this mainly.

NYE COUNTY—TONOPAH

The production from the Tonopah district for the week ended Nov. 6, was 4898 tons, estimated value $122,450.

Montana-Tonopah—The main north crosscut upon the 765-ft. level has been driven 2311 ft., and the breast is still in rhyolite.

Tonopah—During October the largest tonnage ever treated in the history of the mill was run through. A total of 15,100 dry tons of ore was treated having an average content of $19 per ton. The output for the month was $215,000 in bullion and $56,000 from concentrates. The average extraction was 91 per cent.

Tonopah-Belmont Development—All underground work was suspended in order to make surface improvements. The ore bins are being raised and a new Crane ore washer installed.

STOREY COUNTY

The Comstock Pumping Association has given directions to lower the water in the C & C shaft to the 2650-ft. level. As a consequence the Ophir will sink a winze to the 2400-ft. level.

WASHOE COUNTY

Selby Mining Company—Arrangements have been made to increase output of mine and mill at Jumbo.

WHITE PINE COUNTY

Boston-Ely—The shaft is now 1035 ft. deep and has developed a sulphide-ore zone. The company has funds to carry on the work until Jan. 1. when it is probable an assessment of 25c. to 50c. a share will be called.

New Mexico

GRANT COUNTY

Chino—The October report of development shows 189 holes drilled and assayed of which 152 were in ore, the average thickness of which is 81 ft. The estimated developed tonnage to Nov. 1 is 6,341,598 tons having an average assay of 2.46 per cent. copper.

SANTE FE COUNTY

Boston-Cerrillos—The company has made an important zinc strike at the property at Los Cerrillos. A 200-ton mill is on the ground and $200,000 has been spent on improvements.

Ohio

Neff Coal Mine—The tipple and surface buildings of No. 1 mine at Neff were burned Nov. 10, causing a loss of over $100,000 and closing the mine for the present.

Oklahoma

The Standard Oil Company has compromised its controversy with the State by organizing the Oklahoma Pipe Line Company to build an 8-in. line to carry oil to the Standard refinery at Baton Rouge, La. Construction will begin at once, and it is expected that oil will be running by Feb. 1. The company will be under the supervision of the State Corporation Commission, which has authority to regulate rates, and will be exclusively a common carrier and will not buy oil.

The Miami camp is realizing about $15,000 a week and has two or three more mills ready to run.

Mason—This company is pumping out the mine in the Baxter-Quapaw camp and has installed Foust jigs in the mill.

Hannibal and St. Joe—This company at Baxter is pumping and will soon have the mill running.

Oregon

BAKER COUNTY

Mohrwood—Much development has been done on this property in the Greenwood district, disclosing a 3-ft. vein of ore.

Listen Lake—Sinking machinery has been installed to continue the shaft now in oil at 200 ft.

Success—The company will carry on development all winter.

SNOHOMISH COUNTY

Monte Cristo—These mines, which have been closed for two years, will be reopened on a large scale, using water power instead of steam for the mill.

STEVENS COUNTY

Southern Republic—The Princess Maud shaft has been unwatered and work resumed.

Tungsten King—A concentrator is being installed on this property on which a new vein was recently discovered.

South Dakota

Saginaw—Arrangements for the resumption of diamond drilling on the property near Custer are being made by I. W. Herber, president.

Cristoforo Colombo—This company, composed of Italians from Omaha, will develop the property in Strawberry gulch near Deadwood.

Lakota and Transvaal—Work on these properties in the Rochford district will be undertaken by Charles Swanson.

Tennessee

Ducktown Sulphur Copper and Iron—The new 180-ton acid plant has been in operation since the latter part of June. The Mary mine, which is being developed extensively, is producing the bulk of the ore smelted. The East Tennessee, one of the early mines of the "Basin," is also being developed in the deeper levels.

Utah

BEAVER COUNTY

Red Warrior—Ore for shipment is being taken from the 80-ft. winze from the 300-ft. level, sufficient to keep three ore teams busy hauling to Milford. Development work in ore is going ahead also on the 100-, 200- and 300-ft. levels.

Cedar-Talisman—In the Talisman workings a very profitable body of zinc ore is being opened up which in carload lots runs 44 per cent. zinc. In the Cedar workings a silver-lead ore is being developed in a 60-ft. winze from the 100-ft. level and the 500-ft. level is being driven under the ore.

Blackbird—The large territory of this company is being prospected by churn drills.

JUAB COUNTY

Provo—On the 300-ft. level, carbonate ore has been encountered by leasers. This discovery confirms the conviction that the limestone formation on the east side of the district has similar possibilities to the westerly lime formation which gave the district the Centennial Eureka, Eureka Hill, Grand Central and other big mines. Del Roberts is in charge.

Uncle Joe—This company has just acquired the stock of the Copper Jack company and will start to prospect the Copper Jack group with churn drills. This group is in the Erickson district west of Eureka. J. H. Weber is manager.

Eagle & Blue Bell—Shipments for November will be 600 tons. The 900-, 1000- and 1100-ft. levels are looking better and preparations are being made to sink the shaft to 1200 feet.

Mammoth—On the 2100-ft. level, after being for some time in a lean part of the vein, a new lead has been opened which shows promise of shipping ore.

Tintic Standard—At 654 ft. the shaft has passed entirely out of the limestone and has entered quartzite which is the ore bearing formation here. Other favorable indications encourage the management to expect to cut the orebody soon.

Tintic Combination—Work is to be resumed and a steam hoisting equipment installed. B. H. Bullock is manager.

East Tintic Development—This company, operating in East Tintic under direction of Ralph Kellogg, is crocccutting on the 330-ft. level to the east to get under the orebodies above from which they have shipped 18 cars of ore since July 1. On the 500-ft. level a station is being cut and a drift east for the same orebody will be started.

IRON COUNTY

Good Springs Mining and Power Company—The power plant at Modena is under roof and ready for machinery and will be in commission Dec. 8.

Big Fourteen—Fred Snow, of Manti, has taken a lease on this gold and silver mine at Stateline and will resume operations.

SALT LAKE COUNTY

Utah Copper—The production for the third quarter ended Sept. 30, was 15,299,786 lb. of copper compared to 13,774,412 lb. for the preceding quarter and 12,000,925 lb. for the first quarter of the year. The cost of the copper produced is stated to be 8.077c. per lb. It is expected that action will be taken relative to increasing the Garfield mill to 10,000 tons per day.

Ohio Copper—The new mill of 2000-tons capacity is nearly ready for operation.

Hilpert Group—L. Hilpert, after 15 years work on his claims near the mouth of Little Cottonwood cañon, during which he has driven by his own labor a tunnel 1000 ft. long, has encountered between 2 and 3 ft. of ore running $100 per ton in gold. The vein is supposed to be the faulted vein which the Wasatch Utah company has opened. The strike was on the Yellow Jacket claim.

Big Cottonwood Copper and Gold—The tunnel of this company, which is in 700 ft., giving 600 ft. vertical, has encountered commercial ore. Nicholas Treweek is manager.

SUMMIT COUNTY

Scott Hill—The company has decided to continue work throughout the winter and drive a tunnel to the contact from which higher up several good shipments have been made. The property was formerly the Copper Apex. This tunnel was made necessary by the heavy flow of water.

American Flag—This company will install an electric pumping plant. George H. Rathman is manager.

Daly-West—The orebody encountered on the 1700-ft. level has been drifted on for 300 ft. and shows mill ore. The production of the mine will be increased to 600 tons and another shift will be put on at the mill. The Daly-West is drained to the 2100-ft. level by the Ontario tunnel and development between the 1700- and the 2100-ft. levels is to be vigorously pushed.

Silver King Consolidated—The station on the 1500-ft. level has been completed and a gallows frame has been erected at the winze and a cage substituted for the bucket. Work will now be resumed in the ore.

Nelson Queen Consolidated—This company in the Elkhorn district has overcome its financial troubles, purchased machinery and active development will be resumed.

Wisconsin

BARIBOO IRON DISTRICT

The United States Steel Corporation is preparing to embark upon important mining operations in this district. The company has done extensive exploration work for several years, and has developed sufficient ore to justify extensive operations. The Illinois mine of the International Harvester Company has shipped since the opening of the district in 1903, 350,000 tons.

Canada

BRITISH COLUMBIA

Tacoma Company—Shipments of ore from the Marble Bay mine are being maintained at the rate of 1200 to 1500 tons per month. The ore ranges gross from $10 to $30 per ton and is chiefly bornite with gold and silver. The occurrence of bornite ore in large quantity at nearly 1000 ft. depth is of interest. Alexander Grant, Van Anda, Texada island, is manager.

Granby—The smeltery received during October 107,932 tons of ore, of which 105,458 tons was from the Phœnix mine of the company.

NOVA SCOTIA

Dominion Coal—The strike is officially over, the company having announced that no more men are needed. There are 5500 men at work of whom 3000 are underground. On Nov. 9, 9391 tons were mined, this being the highest figure reached since the strike.

ONTARIO-COBALT

King Edward—The dynamite-thawing house at this mine blew up, but no serious damage was done.

North Cobalt—A shipment of high-grade ore will be made in a few days, the first shipment from this section since the Green-Meehan ceased shipping, two years ago.

Nipissing—During the season 24 new veins have been discovered by surface prospecting.

Michigan-Cobalt—A new vein carrying some silver has been discovered on the 85-ft. level.

Little Nipissing—A shoot of high-grade ore has been discovered in the diabase formation, a continuation of the vein on the 165-ft. level, drifting east toward the lake. This is considered a most important discovery for this property.

Ore Shipments—The shipments for the week of Nov. 6 from Cobalt were as follows: La Rose, 340,287, Right-of-Way, 136,361; McKinley-Darragh, 43,582; O'Brien, 64,000; Nipissing, 65,560; total, 649,790 pounds.

Mexico

CHIHUAHUA

Sierra Consolidated—This company, which lately acquired the defunct Greene Gold-Silver properties in the Ocampo section, has started operations. P. M. Atwater is manager, Robert Linton, superintendent. The work will consist of putting in shape the old workings preliminary to development.

Rio Plata—The 25-stamp mill is running full capacity, as is the 75-ton cyanide plant. On the 50-oz. tailings the cyanide mill is making a saving of over 90 per cent. The October output was 36,000 oz. silver from concentrates and 20,000 oz. from cyanide cleanups.

Dolores—The company has announced

an increase in dividends of from 12 per cent. to 18 per cent. effective Jan. 1. The total paid to shareholders is $750,000.

Democracia—Work has been resumed at this Santa Eulalia property under direction of L. M. Terry.

Americana — Shipments of lead ore amounting to three cars weekly are being made from this property at Terrazas. Felix McDonald is the shipper.

Lago—This zinc mine in the eastern part of the state is again sending out shipments of high-grade zinc ore, as is also the Faivre property in the same section.

El Rayo—Recent developments on this mine at Santa Barbara has been most satisfactory. A new orebody has been proven between the San Jose and Petite tunnels much ahead of the former ore and the ore now being mined for the mill, at which an extraction of about 84 per cent. is being made. George A. Schroter is engineer.

DURANGO

Velardeña District—The smeltery is giving a flat rate on silicious ores instead of the penalty of 21 to 25 centavos a unit. The American Smelters Securities Company is doing extensive development on its properties. Two diamond drills are on the San Lorenzo group. Experiments are under way with the zinc ores and concentrates of the camp. The smeltery is running full capacity and there is a report that another copper furnace will be added.

Hileta—This company has a mine adjoining the Terneras of the Securities company. It is developed by three shafts to 300 ft. and two tunnels on the vein, are 1600 ft. long. The veins are not wide but have long oreshoots, one being 500 ft. Carter Barker is manager.

Buena Vista Camp—Considerable activity is reported in this section to the east of Chinacates on the Tepehuanes-Durango branch of the National. The ores are gold-silver. The main operators are the Hancock-Loving Venerable Company and Brackett & Casteen, although work is under way on several other newer denouncements. At the Santa Cruz property of the first-named company a cyanide plant is in course of erection and others are planned.

Promontorio—This mine is being operated successfully. An 80-ton plant for concentration and cyanidation is installed and is producing silver and gold, and lead concentrates. The mine has a large quantity of ore blocked out. Maximiliano Damm is owner.

GUANAJUATO

Guanajuato Amalgamated Gold Mines—The court has approved the plans for the discharge of the receiver and the company will be in control again in a short time. Operations are being carried on at the mine in the La Luz district.

JALISCO

Lawson Development—This enterprise has suspended operations in the Mascota district and will abandon the field. A 30-ton custom reduction plant, recently completed, will be sold. In addition to this plant and the silver-gold mines, the company owns cinnabar deposits and a furnace.

Amparo Company—A contract has been let for sinking the 3-compartment shaft 300 ft. deeper to 1100 feet.

Cinco Minas—F. A. Ross, recently at Hedley, British Columbia, is at the Cinco Minas to make a report to the Daly interests on the development accomplished. A payment on the purchase price of 530,000 pesos is due in January.

Lupita—A cyanide plant will be added to the Lupita works in the Mascota district. Milling will be resumed within a few months.

Esperanza—H. H. Cross and H. W. Young will install a cyanide annex at the small reduction plant of the Esperanza gold mines in the Piginto camp.

Bramador—French interests have acquired extensions of old producers of the Bramador camp, and are treating some ore in the old reduction works.

OAXACA

Humboldt Mining Company—This Boston Company operating the Humboldt mine in Taviche has secured control of all of the properties of the Commonwealth company in the same camp.

Santa Catarina—This mine on the Southern railroad near Oaxaca is not at the present time operating. The tailings are being successfully retreated under a contract. The adjoining property, the Santa Sofia, is developing and blocking out ore.

SONORA

Creston Colorado—The returns from this mine of the Mines Company of America, for the quarter ended Aug. 31, show bullion receipts of $237,445 and a profit of $40,589.

Esmeralda—This mine in the Altar district in charge of F. C. Emery, has made a strike of silver ore.

San Miguel — Superintendent E. J. Schrader will have the mill in operation by Jan. 1.

Cordova—According to E. F. Gray, manager of the Great Northern Development company, operating eleven mining camps in the Copper River country, the Copper River & Northwestern is completed 110 miles out from Cordova.

TAMAULIPAS

Californian interests are negotiating for the Rancho Limón, a tract of 1,000,000 acres along the Tampico branch of the National. Seepages of oil have been observed in several localities within the ranch, and the primary object of the venture will be the search of oil. The price of the property is stated to be $2,500,000.

Africa

TRANSVAAL

Gold production in October is reported at 602,416 oz., being 3969 oz. less than in September, and 15,328 oz. less than in October, 1908. This is the first month this year which has shown a lower return than 1908. For the 10 months ended Oct. 30 the total was 6,077,790 oz., or $125,627,919; an increase of 300,187 oz., or $6,204,865 over the corresponding period last year.

Australia

NEW SOUTH WALES

The general strike of the miners in the Newcastle and adjoining districts continues to spread. Coal shipments have ceased entirely, and there is already a scarcity of coal in Sydney and other towns.

Gold production of the State in October was 25,212 oz. fine, an increase of 424 oz. over October, 1908. The total output for the 10 months ended Oct. 31 was 201,870 oz., or $4,172,653 this year.

Broken Hill Proprietary Company—For October this company reports production of 295,088 oz. silver, 6034 tons lead and 48 tons antimonial lead—nearly all from purchased ores. There were also produced 7601 tons zinc concentrates, containing 163,161 oz. silver, 588 tons lead and 3475 tons zinc.

WESTERN AUSTRALIA

The gold output reported from the State of Western Australia in October was 131,209 oz., being 13,709 oz. less than in September and 5171 oz. less than in October, 1908. For the 10 months ended Oct. 31 the total was 1,371,752 oz. in 1908, and 1,328,024 oz.—or $27,450,256—in 1909; a decrease of 43,728 oz. this year.

Great Boulder—A cable report is that the surface plant at this mine was on fire Nov. 10. The fire on that date had spread rapidly, and it was impossible to say how much damage had been done.

South America

CHILE

Braden Copper—The equipment for increasing the capacity of the old concentrating mill from 250 tons to 400 tons has been shipped and much of the machinery for the new mill, which is to have a capacity of 1600 tons, has been ordered. The Power and Mining Machinery Company will supply two No. 7 gyratory crushers, two No. 5 gyratory crushers, two sets 48x18 rolls, six sets, 36x15 rolls. This equipment will be installed in a separate building in which the ore will be dry crushed to 7 mm. and then taken by conveying belts to the concentrating mill. Jigs, tables, chilean mills, and vanners will be used, but some of the details regarding the concentrating equipment have not yet been decided. The main office of the company in Peru has been moved to Rancagua; Frank Langford, manager. The New York office is at 165 Broadway.

ARGENTINA

Famatina—The company's smeltery is now in operation.

Metal, Mineral, Coal and Stock Markets

Current Prices, Market Conditions and Commercial Statistics of the Metals, Minerals and Mining Stocks

QUOTATIONS FROM IMPORTANT CENTERS

Coal Trade Review

New York, Nov. 17—The coal trade in the West is steady and reports are very good. The trade is a little disturbed by the rush to get coal up the Lakes, but this will soon pass over. Business is good both in steam coal and for domestic fuel at all the large distributing centers.

The Eastern bituminous trade continues good. A good deal of trouble is being experienced from car shortage and seaboard deliveries are seriously delayed. A short supply of cars is causing some complaint in the West also, but does not appear to be bad as on the Eastern lines.

The anthracite trade is good. Just at present there is a considerable quantity of coal being shipped to Buffalo for the Lake trade, but otherwise there is no special movement. Operations at quite a number of collieries are still curtailed by the short supply of water due to the unusually dry season.

There has been heavy buying of the stock of the Pittsburg Coal Company which cannot be traced to any particular source, and this has given rise to all sorts of rumors. One report, coming from Philadelphia, is that it is proposed to consclidate the Pittsburg Coal Company with the Consolidation Coal Company. This has been denied by officers of the last named company. In Pittsburg the favorite theory is that the buying is in the interest of the Steel Corporation. Neither of these reports appears to be based on any positive information.

The announcement by the Pocahontas Collieries Company that it has organized a selling company of its own and has taken its agency away from the firm of Castner, Curran & Bullitt, who have held it for a long time, has caused some surprise in the trade, and there is a good deal of speculation as to the object of the change.

Ohio Coal Rates—The Ohio Railroad Commission has taken up again, after nearly three months' intermission, the complaint of the southeastern Ohio operators charging discrimination in rates against the Wheeling & Lake Erie and other railroads. Hearings will be continued for some time.

Coal Traffic Notes

Receipts of domestic coal at San Francisco, nine months ended Sept. 30, were 320,438 tons in 1908, and 238,153 in 1909; decrease, 82,285 tons.

Shipments of coal by water from Seattle and Tacoma, Wash., nine months ended Sept. 30, were 411,094 tons in 1908, and 267,713 in 1909; decrease, 143,381 tons.

Receipts of coal at St. Louis, nine months ended Sept. 30, were 4,844,173 short tons in 1908, and 4,801,663 in 1909; decrease, 42,510 tons.

Coal and coke tonnage Chesapeake & Ohio railway, three months of fiscal year July 1-Sept. 30, short tons:

	Coal.	Coke.	Total.
New River	2,043,768	88,008	2,131,776
Kanawha	1,493,056	7,470	1,500,526
Kentucky	86,019	.....	86,019
Connecting lines	16,307	11,562	27,869
Total	3,639,150	107,040	3,746,190
Total, 1908	3,088,427	71,832	3,160,259

Total increase, 585,931 tons, or 18.6 per cent. Deliveries this year to points west of mines, 1,877,794 tons coal and 44,040 coke; points east, 407,947 tons coal and 63,040 coke; tidewater, 1,351,994 tons coal.

Coal receipts at Boston, 10 months ended Oct. 31, as reported by Chamber of Commerce:

	1908.	1909.	Changes.
Anthracite	1,464,123	1,415,007	D. 49,116
Bituminous	2,652,641	2,963,200	I. 310,559
Total domestic	4,116,764	4,378,207	I. 261,443
Foreign	312,348	192,953	D. 119,395
Total	4,429,112	4,571,160	I. 142,048

The foreign coal comes chiefly from Nova Scotia and the large decrease is due to the labor troubles there.

The following statement of coal tonnage passing over the Poughkeepsie bridge into New England has been filed with the Public Service Commission of New York. It covers the fiscal year ending June 30:

	1907-8.	1908-9.	Changes.
Anthracite	905,294	1,464,107	I. 558,813
Bituminous	60,640	320,450	I. 259,810
Coke	3,721	21,990	I. 18,269
Total	969,655	1,806,547	I. 836,892

This shows that a considerable tonnage has been diverted from the old routes by Long Island sound since the bridge was reconstructed.

New York

Anthracite

Nov. 17—The anthracite market is again a little improved, although the weather has not been especially favorable. Nevertheless local dealers are putting in more stocks and presumably their customers are doing the same. Shipments are reported to be increasing and the collieries are more generally on full time.

Schedule prices for large sizes are unchanged at $4.75 for lump and $5 for egg, stove and chestnut, all f.o.b. New York harbor. For steam sizes quotations are: Pea, $3.10@3.25; buckwheat, $2.25@2.50; No. 2 buckwheat or rice, $1.75@2; barley, $1.35@1.50; all f.o.b. New York harbor.

Bituminous

The soft-coal market continues to improve, and more orders are coming in from Eastern territory. There is a good deal of activity at the mines, but it is due rather to demand from the West, which is strong now on account of the approach of the close of navigation on the Lakes. Coal is being rushed through to the Lake Erie ports as fast as possible, which is rather delaying shipments to the seaboard. Locally the Far East and the Sound ports are taking coal pretty well, and all-rail trade is good. Some complaint is coming from the Sound ports about delay in unloading vessels and in getting cars away from the wharves, but this does not seem to be much worse than the usual delay on the New Haven road.

Car shortage is getting to be a serious matter, and is worse on account of the demand for Western shipments. On the Baltimore & Ohio the situation is particularly bad, but all the roads are suffering more or less, and it is impossible to get coal to the seaboard as fast as it is wanted. Transportation is also irregular, mainly on account of shortage of locomotives.

There is practically no change in prices, but coal is more firmly held and dealers are not so much inclined to make concessions to secure trade as they have been.

Coastwise trade is pretty good, and rates are again a little firmer. For large vessels from Philadelphia charters are now taken at 85c. per ton to Boston, Salem and Portland. Small vessels from New York harbor points command 65c. to points around Cape Cod.

Birmingham

Nov. 15—Coal production in Alabama is increasing steadily, despite the fact that there is need for miners and mine laborers. The efforts to bring men in for the work in this State are meeting with more or less success but still there is need for much more labor. The demand for coal and coke is holding strong. The coal production will be increased considerably when new mines under development now have progressed far enough to produce coal.

Chicago

Nov. 16—A cold wave over the greater part of Chicago territory has caused a general increase in sales of coal and strength-

ened, though it has not advanced, prices, which threatened to sag somewhat under the influence of continued warm weather. Dealers expect a much better condition this week on all kinds of domestic coal. Sales of steam coal continue large and steady and the market is not over-supplied to any extent. Receipts of Western are well adjusted to the demand. Fine coals alone show any real weakness.

Illinois and Indiana lump and egg bring $2@3; run-of-mine sells for $1.75@1.85, and screenings for $1@1.15 per ton.

Hocking is steady at $3.15; smokeless continues relatively strong, though not so firm as most other coals, lump and egg bringing $3.60@3.80 and run-of-mine $3.05 @3.15. Youghiogheny ¾-in. gas sells for $3.15 and Pittsburg No. 8, in the same size, for $2.55. Predictions of car shortage continue to be made in the trade; but no serious trouble is yet generally felt. Anthracite is in better demand with the change in the weather, and has moved fairly well during the last week.

Cleveland

Nov. 15—Pushing through Lake shipments is the cry the present week, and local trade gets little attention, though demand is good.

The Ohio mine operators will meet here Dec. 7. This is preliminary to a general meeting of the four competitive States, which will be held later.

Prices are firmer. Middle district coal brings $1.40 at mines for 1¾-in., $1.15 for ¾-in., $1.05 for run-of-mine and 70c. for slack; 70c. being added for Cleveland delivery. No. 8 district is $1.35 for 1¼-in., $1.05 for ¾-in., 95c. for run-of-mine and 60c. for slack, all at mine; 90c. being freight to Cleveland. Massillon domestic is $2.95 for lump and washed nut and $1.50 for slack; all f.o.b. Cleveland.

Indianapolis

Nov. 15—The coal trade in this State, after passing through two weeks of strenuous activity, appears to be enjoying a little breathing spell—due perhaps to the mild weather prevailing. Orders at the mines are not so heavy as a fortnight ago, but the fact remains that all the mines are working steadily and the production is still considerably ahead of the facilities for shipment.

The coal market has a good tone in every respect. Local dealers in Terre Haute and other cities have adopted an advanced scale of prices for the winter trade. The dealers explain that this is done because prices have been advanced at the mines, although the operators say there has been no advance since early in October.

Pittsburg

Nov. 16—The flurry in coal is over and asking prices have receded to a normal level, about 10c. above the market of a month or six weeks ago. Lake shipments are still heavy, but the season is nearly over. We quote Pittsburg district coal at $1.15@1.20 for mine-run at mines, and slack at 65@75c. at mine.

Connellsville Coke—The coke market has squarely settled down to a waiting game all along the line. There is about 200,000 tons a month of furnace coke to be bought for next year, but the consumers are manifesting no anxiety whatever. Practically nothing has been done for three weeks and it does not look as if anything would be done for some time, as the market is almost bare even of inquiries. Operators are standing their ground pretty firmly, quoting $2.90@3 for furnace coke on contract, but in the past month there has been a slight weakening in the tone in that operators who formerly asked above $3 would now be content with that figure, and others who quoted $3 would now take $2.95 or $2.90. The foundry-coke market is quiet for next year, and for neither grade is there much inquiry for spot.

We quote standard Connellsville furnace coke at $2.90 for prompt or contract, prompt foundry at $3@3.25 and contract foundry at $3.25@3.50 at oven.

The *Courier* reports the production in the Connellsville and lower Connellsville region in the week ending Nov. 6 at 455,055 tons, a gain of 4000 tons over the previous week, and shipments of 5012 cars to Pittsburg, 8083 cars to points west of Pittsburg and 790 cars to points east of Connellsville, a total of 13,885 cars, or 500 cars less than in the preceding week.

St. Louis

Nov. 15—The local market has been losing strength steadily ever since the first of the month. The continued warm weather, which is most unseasonable, has, of course, slowed down the demand from dealers, in fact the yards are practically at a standstill now. The demand from even the country to the west is slow and little new business has come in during the week. A number of dealers are asking for some relief on contract coal, as they are unable to handle their full tonnage under present conditions.

The industrial situation on the other hand seems to be improving. Steam plants are nearly all running full time and a number of them are preparing to work double shifts. All steam plants in this vicinity are complaining that they are having trouble in getting sufficient labor, which is a marked contrast to conditions which prevailed all summer. The falling off in demand of the domestic market and the increase of the industrial situation has braced up the market for steam sizes, such as screenings and nut coal. The demand from the Northwest continues strong and operators of high-grade mines in southern Illinois are away behind with orders, and are getting better and better prices right along. The only mines that are affected by the local depression are those situated in the inner groups which are tributary to St. Louis.

The car situation throughout the entire State seems to be getting worse and worse. Not only has the Carterville field had a poor week's run but every road in central and northern Illinois has also been short of equipment. In fact the whole State of Illinois as an average did not run more than half time last week.

Carterville 6-in. lump or egg is bringing $1.75 at mine or $2.42 St. Louis. No. 1 nut is $1.50 at the mine or $2.17 St. Louis. Screenings are 30c. at mine or 97c. per ton St. Louis. Franklin county 6-in. lump and egg are strong at $2 per ton mine or $2.67 St. Louis; while 3-in. nut is $1.55 at mine of $2.22 St. Louis. Staunton Mt. Olive or Springfield district 6-in. lump is worth $1.50 per ton mine or $2.02 St. Louis; 3-in. lump is now $1.25 at mine or $1.77 St. Louis. Nut coal is worth 85c. mine or $2.22 St. Louis. Staunton, Mt. lump is worth $1.20 mine or $1.72 St. Louis, while 2-in. lump is $1 mine or $1.52 St. Louis. Screenings are worth little or nothing at the mines and the poorer grade can be had for the freight in St. Louis. Steam nut coal is bringing 35c. at mine or 87c. St. Louis. Carterville No. 1 washed is $1.75 mine or $2.32 St. Louis.

The anthracite market is in poor condition and practically the same as it was last week. Chestnut coal is as scarce as ever.

Foreign Coal Trade

German Coal Trade—Exports and imports of fuel in Germany, nine months ended Sept. 30, metric tons:

	Exports.	Imports.	Excess.
Coal	16,767,860	8,690,855	Exp. 8,077,005
Brown coal	25,406	6,060,877	Imp. 6,035,471
Coke	2,519,363	493,980	Exp. 2,025,383
Briquets	1,172,386	150,476	Exp. 1,021,910
Total	20,485,015	15,396,188	Exp. 5,088,827
Total, 1908	19,402,203	15,866,080	Exp. 3,536,123

The coke exports this year included 28,911 tons to the United States.

German Coal Production—Coal production of German Empire, nine months ended Sept. 30, metric tons:

	1908.	1909.	Changes.
Coal	111,391,925	110,635,897	D. 756,028
Brown coal	48,892,403	49,704,071	I. 811,668
Total mined	160,284,328	160,339,968	I. 55,640
Coke made	15,836,933	15,775,206	D. 61,727
Briquets made	13,631,513	13,879,301	I. 247,788

Of the briquets reported this year 11,023,629 tons were made from brown coal, or lignite.

Welsh Coal Market—Messrs. Hull, Blyth & Co., London and Cardiff, Wales, report prices of coal as follows on Oct. 30: Best Welsh steam, $4.08; seconds, $3.84; thirds, $3.66; dry coals, $4.02; best Monmouthshire, $3.48; seconds, $3.36; best small steam, $2.16; seconds, $1.68. All prices are per long ton, f.o.b. shipping port, for cash in 30 days, less 2½ per cent. discount.

Iron Trade Review

New York, Nov. 17—Comparative quiet seems to have settled over the iron and steel trades this week. Although business may still be considered very good, there is less rush to purchase material, and buyers seem to be satisfied for the present. The large steel companies also are not anxious to sell beyond the first quarter of next year, at the present time. Some contracts have been made, but the placing of business for periods later in the year is apparently delayed by both parties.

Pig iron partakes of the generally quieter tone. Sales continue to be made of foundry and there is a good deal of inquiry for basic iron. Furnaces, however, are not pressing for orders running beyond the first quarter or at most the first half of 1910. Some canvassing is going on for orders for foreign pig iron along the seaboard, and it is said that attractive offers of some large tonnages have been made.

In finished material, the heaviest business now under consideration is in sheets and tinplates. The principal producers have announced that an advance in these articles will be made Jan. 1 next. Some structural steel and shapes have been taken and some good orders for buildings and for steel cars are noted, which will require a considerable tonnage.

It is positively stated that no action will be taken on Lake Superior iron-ore prices before Dec. 1. There is a good deal of talk of an advance of 50c. in prices at Lake ports, and it is quite probable that this will be made for next season.

Lake Superior Iron Ore—Shipments of iron ore from the Lake Superior region in October were 6,625,801 tons, being about 425,000 tons less than in September, chiefly on account of stormy weather which delayed vessels. For the season to Nov. 1 the total shipments were, in long tons:

Port.	1908.	1909.	Changes.
Escanaba.....	2,746,116	4,930,971	I. 2,184,855
Marquette.....	1,177,730	2,507,712	I. 1,329,982
Ashland.....	2,019,948	3,136,275	I. 1,116,327
Superior.....	2,908,619	5,747,454	I. 2,838,835
Duluth.....	7,931,568	11,850,038	I. 3,918,470
Two Harbors.....	4,946,091	8,092,884	I. 3,146,793
Total.....	21,730,072	36,265,334	I. 14,535,262

The total to the corresponding date in 1907 was 37,041,861 tons, or only 776,527 tons more than this year.

The Cleveland *Iron Trade Review*, from which the figures above are taken, has begun also to report the receipts at the lower ports. For two months, September and October, these were: Lake Erie ports, 11,329,309; Lake Michigan ports, 2,105,841; total, 13,435,150 tons.

Bethlehem Steel Corporation—The stockholders have voted to authorize the issue of $5,000,000 in 6 per cent. five-year notes, secured by pledge of stocks owned by the company. The money is to be used to pay for extensive additions to the mills at Bethlehem, and for development of the company's iron-ore holdings.

Baltimore

Nov. 16—Exports for the week included 1835 tons steel rails to Australia. Imports included 3300 tons spiegeleisen and 200 tons silicospiegel from Great Britain; 500 tons manganese ore from Antwerp, 1000 tons from Middlesboro, England, and 6700 tons from India; 9000 tons iron ore from Cuba; 1377 bars lead from Antwerp.

Birmingham

Nov. 15—There is not much selling going on but the Southern pig-iron market remains firm. There is a healthy production in the Southern territory. The only delay heard of now is in business placed several months ago when the prices were much under those now prevailing. Efforts to find if concessions are being made on the $15 per ton rate for No. 2 foundry, have been in vain. The larger manufacturers announce positively that $15 is the price for delivery during the first half of the coming year. The Alabama make in November promises to exceed that of October, when this State was given credit for 176,266 tons.

The cast-iron pipe plants continue to melt a large amount of pig iron. The pipe is being shipped out in all directions.

At the steel plants there is steady activity. Besides rails, about 6000 tons of plates and bars are being produced monthly in this territory. The announcement that the American Steel and Wire Company, a subsidiary of the United States Steel Corporation, will erect a big plant in the Birmingham district on property recently purchased by the Tennessee company causes interest.

Chicago

Nov. 16—The iron market continues quiet but firm. Sales of pig iron are steady and widely distributed, but are not for large amounts; the tendency of the melter continues to be to buy three to six months ahead, with contracts running into the third quarter steadily increasing and a little quick-delivery iron in demand. Southern iron is selling at $14.50@15 Birmingham ($18.85@19.35 Chicago), and is nearer to a stage of dullness than Northern iron, which at $19@19.50 continues strong. Inquiries are good and the situation generally is such as to cause expressions of confidence for the future from furnace agents. It is the expectation of some of those acquainted with the trade that the present quiet will last up to the first of the coming year because of the disposition indicated by melters to run closely to their immediate needs until that time.

Sales of iron and steel products continue large and extend to practically every branch of the trade. Coke is very strong with both Connellsville and Wise County selling at $5.50 Chicago.

Cleveland

Nov. 16—Ore arrivals continue to be heavy. The Cleveland receipts in September and October were 2,046,327 tons. These were exceeded by two other Lake Erie ports, Ashtabula with 2,782,257 and Conneaut with 2,118,142 tons.

Pig Iron—The market is rather quiet for the time being on foundry and basic pig. Furnaces are not willing to take second-half orders yet. Quotations are firm at $17.75@18 for basic; $18.25@18.50 for No. 2 foundry: $17.25@17.75 for gray forge; $19.50@20 for Lake Superior charcoal.

Finished Material—There is some inquiry for steel billets. Bars are in demand and early deliveries are not to be had. The mills are holding back on orders for the second half of next year.

Philadelphia

Nov. 17—After a few days of quiet, consumers of basic and forge iron are again endeavoring to place orders for more remote delivery on account of the hardening tendency in prices. The consumption of all kinds of pig iron has increased beyond early autumn anticipations and buyers are, therefore, more anxious to provide against emergencies. No recent large orders for basic pig have been definitely placed. Foundry irons are difficult to obtain for early delivery. Southern furnaces are holding iron at top prices. A few customers have asked for assurances that their December orders will be booked at current rates and half promises have been given at that effect. Basic iron is hard to get at any price and it is quoted at $19 nominally. Both Northern and Southern forge are quoted at $18. No. 2 foundry was offered today at $19.75. Some contracts have been booked at 50c. less.

Steel Billets—The concerns using billets have been working up their stock faster than was anticipated and there is some difficulty in getting deliveries of steel recently contracted for.

Bars—Prices have been advanced on all recent business in small lots, about $2 a ton. In some cases premiums have been offered for spot delivery. Both country and city stores have been cleaning out stocks rapidly.

Sheets—Sheets have been advanced again in both wholesale and retail lots in consequence of the improving demand. Inquiry reveals the fact that stocks at most of our distributing centers are next to nothing.

Pipes and Tubes—The accumulation of orders at mills continues and this territory is now absorbing fully one-half more than a year ago. The higher level of prices is easily maintained.

Plates—The advance in plates in western markets has been followed by light advances here. A few belated buyers are

glad to offer premiums on small lots. Small lots of tank and boiler plate are selling from $2 to $3 a ton over two weeks ago.

Structural Material—While there are rumors relating to large transactions soon to be closed nothing definite has transpired worth noting. The usual run of small orders is spoken of, and an advance of about $2 a ton has been established.

Steel Rails—The sales reported by railmakers for the week relate mainly to small orders for light sections. A large rail business is in sight.

Scrap—No change has occurred in the market. Prices remain as they were last week. The larger dealers are quite busy gathering up material which they have contracted to deliver.

Pittsburg

Nov. 16—Strictly new business continues light with the steel mills, but producers welcome the condition as it offers the hope of catching up with business, while consumers are so well covered that new buying at this time, with mill capacity sold for months ahead in most lines, would necessarily be largely of a speculative character.

There is no decrease in the volume of specifications on old contracts. As a rule these specifications are in excess of current output, and they are so heavy partly because buyers must take advantage of low-priced contracts which expire with the year and because they wish to make sure of getting deliveries as needed.

On Nov. 12 the American Sheet and Tin Plate Company announced advances approximating $2 a ton on tinplates and black sheets and $3 a ton on galvanized material. The advances were as follows: Tinplates, $3.50 to $3.60 for 100-lb. cokes; blue annealed sheets, 1.70 to 1.75c. for No. 10 gage; box annealed sheets, 2.30 to 2.40c. for No. 28 gage; galvanized sheets, 3.35 to 3.50c. for No. 28 gage; corrugated roofing, No. 28 gage, 2½-in. corrugations, painted, $1.60 to $1.70 per square; galvanized, $2.85 to $3 per square.

Pig Iron—Sales of bessemer pig iron since the first of the month exceed 50,000 tons. The Jones & Laughlin Steel Company took 20,000 tons on Nov. 11, half from the Bessemer Pig Iron Association and half from W. P. Snyder & Co., for delivery over two or three months, while other consumers took about 30,000 tons, some of the purchases having been made early in the month, but not hitherto reported. These sales were all at $19, Valley, at which the market seems to have been pegged by the large producers. They could have obtained somewhat higher prices, but seem to fear the results of any further advance. The $19 price was first done Oct. 11, the market having advanced from $16.75 since Sept. 1. A prominent merchant producer has bought several lots of iron at above $19 and is reported to have paid as high as $19.50 in one instance. Demand for foundry iron has been light, and the market has been somewhat disturbed by the aggressive selling, at cut prices, of a merchant furnace on the outskirts of the Mahoning valley, this interest having even shaded $17, while $17.25 has been the minimum of practically all other sellers.

Current quotations at Valley furnace are: Bessemer, $19; basic, $17.25@17.50; foundry, $17.25@17.75; malleable, $17.50@18; gray forge, $16.25@16.50 per ton.

Steel—On Nov. 12, concurrent with the American Sheet and Tin Plate Company's announcement of advanced prices, the Carnegie Steel Company announced that its price would be $30, Pittsburg, on such sheet-bars as it might be able to spare for first quarter. The market for early delivery had been about $28. None of the mills had been openly selling for first quarter, being doubtful about the price and uncertain whether they would have much tonnage to spare, but the Carnegie announcement is accepted as setting a price for such delivery. Odd lots of sheet-bars for early delivery have been far from scarce, but as mills are well covered for the time being they have found no market except with mills willing to carry them on this rising market. Billets are quoted nominally at $27, Pittsburg, but are hard to get at that figure. The Maryland Steel Company is reported to have sold 45,000 tons of bessemer billets for shipments west as fast as they can be produced, and it is possible that the tonnage is being taken by Steel Corporation subsidiaries.

Ferromanganese—The market continues to strengthen. No definite information has come out as to how much the Carnegie Steel Company has bought, but it is known that it has taken a considerable tonnage. The market is strong at $44.50@45 for prompt and $45.50@46 for next year, f.o.b. Baltimore.

St. Louis

Nov. 15—The market for pig iron has continued to be strong though the actual amount of business closed has been light, owing to the fact all the largest contracts for the season have been closed, and all furnaces are pretty well sold up for the first half. A number of buyers have been in the market for small lots. Prices for delivery for the first half remain unchanged and are $15@15.25 per ton Birmingham or $18.75@19 per ton St. Louis for No. 2 foundy. All of the foundries and tinplate mills in Granite City and the manufacturing suburbs of St. Louis are now on full time and expect to run without interruption until their regular annual shut down next summer.

Iron Ore—The call for Missouri ore is keeping pace with the advancing iron market and it is in strong demand at $3.75 per ton f.o.b. St. Louis, for 50 per cent. ore.

Metal Markets

New York, Nov. 17—The metal markets show activity in several directions. The copper market is agitated by reports of a combination of the producers in some form. Sales have been large.

Gold, Silver and Platinum

UNITED STATES GOLD AND SILVER MOVEMENT

Metal.	Exports.	Imports.	Excess.
Gold:			
Sept. 1909..	$ 7,546,442	$ 2,350,958	Exp. $ 5,195,484
" 1908..	3,974,391	4,767,051	Imp. 792,660
Year 1909..	97,272,834	31,105,193	Exp. 66,167,641
" 1908..	68,937,380	38,427,973	" 30,509,407
Silver:			
Sept. 1909..	4,385,532	3,261,397	Exp. 1,124,135
" 1908..	4,198,286	3,370,591	" 827,695
Year 1909..	43,289,116	33,240,530	" 10,048,586
" 1908..	38,781,380	30,792,704	" 7,988,676

Exports from the port of New York, week ended Nov. 13: Gold, $1,304,000, chiefly to Brazil; silver, $960,907, to London and Paris. Imports: Gold, $114,885, from Australia, Central and South America; silver, $35,028, from Mexico and the West Indies.

Gold—The demand for gold on the open market in London was good but not pressing, and the price was 77s. 9d. per oz. for bars and 76s. 4d. per oz. for coin. The Bank of England took most of the gold offered. In New York more gold was taken for South America, a total of $3,000,000 being reported this week.

Platinum—Business is reported active, especially with the jewelry trade. The price remains unchanged, dealers still asking $29.50 per oz. for refined platinum and $33.25 for hard metal. No offers of outside metal are now heard.

Our St. Petersburg correspondent writes, under date of Oct. 28, that there has been a further advance in prices. At Ekaterinburg quotations are 5.25 rubles per zolotnik for crude metal, 83 per cent. platinum—equal to $19.74 per oz. At St. Petersburg the nominal quotation for crude metal is 22,000 rubles per pood, but sales have been made at 22,250 and 22,500 rubles—the latter equal to $22.05 per oz. A further increase is expected, and reports from Paris show increased demand.

Silver—The market has been steady, fluctuations being within ⅛d. The Indian export season is become active, and the stock of rupees in the treasury is being reduced. In the next few months probably large withdrawals will be made, and then the prospect of the Indian government buying silver will be materially nearer. The situation would then call for serious attention. The chance of such action, however, is not in the near future.

SILVER AND STERLING EXCHANGE

Nov.	11	12	13	15	16	17
New York....	50¾	50¾	50¾	50¾	50¾	50¾
London.....	23¾	23⅞	23¾	23¾	23⅞	23¾
Sterling Ex..	4.8725	4.8735	4.8735	4.8730	4.8725	4.8730

New York quotations, cents per ounce troy, fine silver; London, pence per ounce sterling silver, 0.925 fine.

Exports of silver from London to the East, Jan. 1 to Nov. 4, as reported by Messrs. Pixley & Abell:

	1908.	1909.	Changes.
India.....	£ 8,208,563	£5,282,400	D. £2,926,163
China.....	516,400	1,555,200	I. 1,038,800
Straits.....	164,885	82,800	D. 82,085
Total.....	£ 8,889,848	£6,920,400	D. £1,969,448

Indian exchange in London, 16.03d. per rupee.

Copper, Tin, Lead and Zinc

Nov.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. New York, Cts. per lb.	Lead. St. Louis, Cts. per lb.	Zinc. St. Louis, Cts. per lb.
11	13 @13¼	12⅞ @13	58¾	30⅞	4.35 @4.37½	4.22½ @4.27½	6.20 @6.25
12	13 @13¼	12⅞ @13⅛	58⅞	30¾	4.35 @4.37½	4.22½ @4.27½	6.20 @6.25
13	13 @13¼	12⅞ @13⅛	....	30½	4.35 @4.37½	4.22½ @4.27½	6.20 @6.25
15	13⅛ @13⅜	13 @13¼	59	30¾	4.35 @4.37½	4.22½ @4.27½	6.22½ @6.25
16	13⅛ @13⅜	13⅛ @13¼	60	30¾	4.35 @4.37½	4.22½ @4.27½	6.22½ @6.25
17	13⅜ @13⅜	13⅛ @13⅜	59¾	30¾	4.35 @4.37½	4.22½ @4.27½	6.22½ @6.25

London quotations are per long ton (2240 lb.) standard copper. The New York quotations for electrolytic copper are for cakes, ingots and wirebars, and represent the bulk of the transactions made with consumers, basis, New York, cash. The prices of casting copper and of electrolytic cathodes are usually 0.125c. below that of electrolytic. The quotations for lead represent wholesale transactions in the open market. The quotations on spelter are for ordinary Western brands; special brands command a premium.

Copper—During the week of Nov. 11 to 17 the market has been dominated by the prospect of a consolidation of certain large producing interests, with talk of a curtailment of production as a result thereof. It is generally recognized that manufacturers the world over have allowed the producers to carry the stocks during the last year or so. Now that there appears to be prospect of a corrective, even if it be artificial, to a vexing statistical situation there has been manifested a disposition to lay in supplies. This, together with speculative buying, has resulted in a very heavy business during the week. Sales both for home trade and for export have been on a larger scale than for a long time past. The aggregate for the week has doubtless been upward of 50,000,000 lb. What proportion has been to manufacturers and what to speculators it would be difficult to say. The sales have been made by all of the large producing interests and some of them claim to have now disposed of their production for two or three months ahead. Although sellers have advanced their prices from day to day, the demand continues unabated, and the close is firm at 13⅜@13⅝c. for Lake copper, and 13⅛@13⅜c. for electrolytic copper in cakes, wirebars and ingots. Casting copper is quoted nominally at 12⅞@13⅛ cents.

Copper sheets are now 18c. base for large lots. Full extras are charged, and higher prices for small quantities. Copper wire has been advanced ¼c. to 14¾c. base, carload lots at mill. Business is excellent.

In spite of a further increase in the visible supply of 3500 tons, the standard market has been active and firm throughout the week, and closes at £59 17s. 6d. for spot, and £61 for three months.

Refined and manufactured sorts we quote: English tough, £63 10s.; best selected, £62 10s.@£63 10s.; strong sheets, £74 10s.@£75 10s. per ton.

Exports of copper for the week from New York and Philadelphia were 7143 long tons. Our special correspondent gives no exports from Baltimore.

Tin—The London market, as well as the domestic market, has been active and firm during the past week. Among dealers on this side and consumers, a good deal more interest for the metal was shown than for a long time past, and prices in this market have again reached the import basis. The statistical position of the metal is a very favorable one, and the supply of spot material will, at the present rate of consumption, decrease rapidly. At the close, London is cabled at £139 12s. 6d. for spot, and £141 12s. 6d. for three months, while tin in this market can be bought at about 30¾ cents.

Arrivals of Bolivian tin ore and concentrates at Hamburg, Germany, in October are reported by Messrs. Robertson & Bense at 786 long tons.

Shipments of tin from the Straits Settlements in October were 4542 long tons in 1908, and 3801 in 1909; decrease, 741 tons.

Lead—The market is unchanged at 4.22½@4.27½c. St. Louis, and 4.35@4.37½c. New York. The nominal price of the American Smelting and Refining Company for desilverized continues to be 4.40c., New York.

The London market has shown a better tone, and closes firmer at £13 2s. 6d. for Spanish, and £13 5s. for English lead.

Spelter—There has been sufficient inquiry to maintain the market at the last prices, and the close is steady at 6.37½@6.40c. New York, and 6.22½@6.25c. St. Louis.

New York quotations for spelter on Nov. 11 to 13, inclusive, were 6.35@6.40c.; Nov. 15 to 17, inclusive, 6.37½@6.40 cents.

Base price for zinc sheets is 8c. per lb., f.o.b. La Salle-Peru, Ill., less 8 per cent. discount.

The market abroad is holding its own, the close being cabled at £23 5s. for good ordinaries, and £23 10s. for specials.

Silesian Spelter Market—Paul Speier writes from Breslau, Germany, under date of Oct. 27, that the market continues steady, with little change. Quotations are 46.75 marks for ordinary brands and 47.75 marks per 100 kg. for refined brands—equal to 5.05c. and 5.15c. per lb.—f.o.b. works in Silesia. Zinc sheets are 56@61 marks per 100 kg., base price at works; equal to 6.05@6.58c. per lb. Zinc dust is in better demand for export, and is quoted 43.50 marks per 100 kg.—4.7c. per lb.—in large lots, boxed, f.o.b. Stettin.

Other Metals

Antimony—Dealers look forward to better business and some advance in quotations after the close of the year; but at present the market is dull, and prices are unchanged. Cookson's is quoted at 8⅛@8½c. per lb.; Hallett's 8¼@8⅜c.; U. S., 7⅞@8c.; outside brands, 7⅝@7¾c. per pound.

Aluminum—The price of aluminum continues unchanged at 20@23c. per lb. for ingots. The higher price is that asked by the American producer.

Quicksilver—Business is good and the market continues strong. In New York the quotation is $52.50 per flask of 75 lb. for large lots, early delivery; for small lots 72@ 75c. per lb. is asked by jobbers. The San Francisco quotation is $50.50@51.50 per flask for domestic orders, and $2 less for export. The London price has again been advanced and is now £9 15s. per flask, with jobbers asking 2s. 6d. more.

Magnesium—The price of pure metal is $1.50 per lb. for 100-lb. lots f.o.b. New York.

Nickel—Large lots, contract business, 40@45c. per lb. Retail spot, from 50c. for 2000-lb. lots, up to 55c. for 500-lb. lots. The price for electrolytic is 5c. higher.

Cadmium—Current quotations are 65@70c. per lb. in 100-lb. lots at Cleveland, Ohio. In Germany 450@475 marks per 100 kg., at factory in Silesia.

Zinc and Lead Ore Markets

Platteville, Wis., Nov. 13—The base price paid this week for zinc ore was $50@50.50 for 60 per cent. zinc. The base price paid for lead ore was $56 per ton.

SHIPMENTS, WEEK ENDED NOV. 13.

Camps.	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Platteville.....	430,980	.....	264,900
Mineral Point.....	398,000	.....	.....
Highland.....	337,500	86,100	.....
Galena.....	314,000	.....	.....
Benton.....	243,900	.....	240,000
Days Siding.....	176,000	.....	.....
Cuba City.....	155,910	88,770	112,460
Shullsburg.....	145,000	.....	.....
Rewey.....	84,000	.....	.....
Linden.....	.....	.....	60,310
Total.....	2,285,290	174,870	677,670
Year to Nov. 13.....	121,643,055	8,139,645	13,566,185

In addition to the above there was shipped to the roasting plants, Mineral Point and Galena, and to the electrostatic separator, Platteville, 1,658,570 lb. zinc ore.

Joplin, Mo. Nov. 13—The highest price paid for zinc sulphide ore was $54 per

ton, the assay basis price ranging from $50 to $53 per ton of 60 per cent. zinc. Zinc silicate ore sold on a base price of $27@28, and with the higher grades not loaded out the best price was $30 per ton. The average price, all grades of zinc ore, was $48.30. Lead ore sold as high as $56 per ton until today, when it dropped to $53. The larger part of the shipment was on the higher level of prices and the average price was $54.88 per ton. The week-end zinc market was an anomaly, as prices had declined to $52 high base Thursday evening, with a large tonnage sold at a decline of 50c. to $1 per ton, but on Friday a couple of buyers crossed one another and before night the $53 base price was bid.

Continued heavy rains daily are fast putting mines out of commission, and the output, already decreased this week, will be still smaller next week. Five mines have been inundated by Center creek, and the heavy rains tonight, it is feared, will inundate mines along Spring river.

SHIPMENTS, WEEK ENDED NOV. 13.

	Zinc, lb.	Lead, lb.	Value.
Webb City-Carterville	3,227,490	901,730	$107,097
Joplin	1,563,570	368,060	50,657
Miami	622,820	294,140	21,790
Galena	742,170	88,160	20,980
Prosperity	473,630	183,850	17,132
Granby	800,200	2,000	13,132
Oronogo	217,970	182,880	13,085
Badger	379,700	3,770	9,782
Alba-Neck	390,350	.....	9,759
Spurgeon	359,150	50,240	8,628
Jackson	299,410	.....	7,335
Quapaw	291,360	.....	7,138
Zincite	191,210	.....	4,971
Sarcoxie	171,240	.....	3,858
Carthage	149,560	.....	3,739
Aurora	189,550	.....	3,564
Duenweg	138,700	6,800	2,997
Carl Junction	65,570	.....	1,770
Stott City	55,160	.....	1,434
Purdy	35,070	.....	490
Totals	10,463,880	2,081,630	$309,861
46 weeks	522,410,070	78,635,930	$12,654,093
Zinc value, the week, $252,739; 46 weeks,			$10,506,675
Lead value, the week, 57,122; 46 weeks,			2,147,418

MONTHLY AVERAGE PRICES

Month.	Zinc Ore. Base Price.		Zinc Ore. All Ores.		Lead Ore. All Ores.	
	1908.	1909.	1908.	1909.	1908.	1909.
January	$37.60	$41.25	$35.56	$38.46	$46.88	$52.17
February	36.63	36.94	34.92	34.37	49.72	50.50
March	36.19	37.40	34.19	34.71	49.90	50.82
April	35.40	38.63	34.08	37.01	52.47	55.63
May	34.19	40.06	33.39	37.42	56.05	56.59
June	33.06	44.15	32.07	40.35	60.48	57.52
July	34.55	43.06	31.67	41.11	59.90	53.74
August	36.53	48.25	33.42	44.54	60.34	57.60
September	37.63	47.70	34.44	44.87	54.59	56.11
October	35.95	49.50	33.28	45.75	52.63	55.02
November	39.13	.....	35.02	.....	54.53	.....
December	42.75	.....	39.63	.....	49.68	.....
Year	$36.63	.....	$34.31	.....	$53.93	.....

NOTE—Under zinc ore the first two columns give base prices for 60 per cent. zinc ore; the second two the average for all ores sold. Lead ore prices are the average for all ores sold.

Petroleum

Petroleum production and shipments as reported by the *Oil Investor's Journal* for the month of October, in barrels of 42 gal. each:

	Production.	Shipments.
Oklahoma	3,631,488	3,620,685
Southeast Texas	696,840	780,876
Louisiana	244,500	235,530

Oklahoma stocks on Nov. 1 were 56,775,398 bbl. New producing wells completed in October were: Oklahoma, 133 oil and 5 gas; southeast Texas, 21 oil and 1 gas; Louisiana, 4 oil and 1 gas well.

Chemicals

New York, Nov. 17—The general market is still quiet, but some inquiries are being received, which indicate a slight improvement in business.

Copper Sulphate—There is no special activity in this article, and prices are unchanged at $3.95 per 100 lb. for carload lots and $4.20 per 100 lb. for smaller parcels.

Arsenic—Sales have been small, but some inquiries have been received. Futures are a little weaker, current quotations being 2.75c. for both spot and futures on white arsenic.

Nitrate of Soda—Business has been rather dull, and there is no life in the market. Spot nitrate is a little weaker, being offered at 2.07½c. per lb. Futures, however, are still held at 2.10c. for all positions next year.

Potash Salts—Exports of potash salts from Germany, nine months ended Sept. 30, metric tons:

	1908.	1909.	Changes.
Kainit, kieserit, etc	505,086	542,396	I. 37,310
Potassium chloride	107,220	142,023	I. 34,803
Potassium sulphate	32,532	40,901	I. 8,369
Pot.-magnesium sul	91,352	91,111	D. 241
Total	736,190	816,431	I. 80,241

Of the total exports the United States took 309,489 tons in 1908, and 367,262 tons in 1909; an increase of 57,773 tons.

Mining Stocks

New York, Nov. 17—At the opening of the week the general stock markets were rather irregular with some inclination to weakness. As the week advanced trading became more active, especially in the copper stocks, and the volume of business increased. Amalgamated Copper and American Smelting and Refining were especially strong and were leaders in the trading. The coal-road stocks were also largely dealt in throughout the week. Amalgamated Copper reached $94 per share, the highest reported for a long time.

In Philadelphia and Pittsburg there was heavy buying of Pittsburg Coal issues. No one seems to know who the purchasers of these stocks were.

The Curb market, like the Stock Exchange, was rather weak at the commencement, but became much more active and stronger later. The feature of the week on the Curb was the heavy dealing in the copper stocks and the considerable advance in prices, amounting almost to a boom. This was based on the current reports of a merger or consolidation of copper companies which was to serve the purpose of regulating production and advancing prices of the metal. The denial of some of these reports made little difference to the market. The Cobalt stocks were stronger on some good dividend announcements.

The Standard Oil Company has declared a dividend of $10 for the fourth quarter of the year. This makes a total of $40 per share for 1909, the same amount as last year.

Boston, Nov. 16—Copper shares are receiving a larger amount of attention than for a long period, as a result of the tentative plans to form a big copper combination. Speculation has been mainly in the Amalgamated, Cole-Ryan and Guggenheim issues and some very pretty market movements have been witnessed. Public interest is on the increase and a few days more like those seen yesterday and today would bring a good-sized following into the local market.

Amalgamated has been the big card and has risen a point daily or from $87.25 to $94.12½. This stock is reported to have been accumulated from $80 up by inside interests. North Butte hung fire around $60 but made a good start yesterday and touched $64.75 today. Butte Coalition has had good market action right along. Its high was $33.62½, ex-dividend, which represents almost a $5 advance during the week. Utah Copper had a sharp spurt from $51.50 to $59.62½ on limited trading in this market.

Although the Lake Michigan stocks have been laggards in the late rise, both Lake Copper and Superior recorded sharp advances. The former rose $4 to $42, which is its record. Superior spurted $3.50 to $66.25, which is also its record price.

Other strong spots have been Nevada Consolidated, which rose $3 to $30.50; Parrot rose $2 to $30.75; Utah Consolidated $2.75 to $47; Giroux $1.87½ to $11.75; North Lake $1.37½ to $8.37½; Boston Consolidated $2.75 to $17.25 per share.

Curb trading has also picked up. Ohio Copper has been the late feature with a rise close to $6. Cumberland-Ely rose to above $9. Massachusetts Coal and Power is a new Curb issue with sales at $2.50@2.25. This represents a coal property located at Mansfield, this State. There are 367,525 shares issued and 132,475 in the treasury.

Los Angeles, Cal., Nov. 2—Realizing the value to the mining interests of the Southwest of a permanent mineral exhibit, practically all of the railroads owning or operating lines in Arizona, Nevada, New Mexico, California, and Old Mexico, have agreed to coöperate with the Los Angeles Chamber of Mines in an endeavor to as-

semble in Los Angeles a mining and oil exhibit, which will be second to none in the United States. The Pacific Freight Tariff Bureau has been instructed to include in the next tariff a provision granting a free rate on all ore and oil specimens consigned to the Chamber from points on their lines and intended for exhibition purposes.

STATISTICS OF COPPER.

Month.	United States Product'n.	Deliveries, Domestic.	Deliveries for Export.
I	112,135,200	51,862,624	38,499,797
II	103,700,817	43,578,118	30,968,496
III	117,058,661	48,871,964	59,191,043
IV	113,574,292	47,546,010	65,110,111
V	118,356,146	61,163,325	70,542,753
VI	116,567,493	60,591,116	70,966,457
VII	118,277,603	75,520,083	75,018,974
VIII	120,597,234	59,614,207	48,382,704
IX	118,023,139	52,105,955	50,077,777
X	124,657,709	66,359,617	56,261,238
XI			
XII			

VISIBLE STOCKS.

	United States.	Europe.	Total.
I	122,357,266	124,716,480	247,073,746
II	144,130,045	118,574,400	262,704,445
III	173,284,248	117,140,800	290,425,048
IV	182,279,902	115,024,000	297,303,902
V	183,198,073	114,050,320	297,248,393
VI	169,848,141	127,352,960	297,201,101
VII	154,858,061	150,928,960	305,787,021
VIII	122,896,607	171,492,160	294,088,767
IX	135,196,930	197,993,600	333,190,530
X	151,472,772	210,224,000	361,696,772
XI	153,509,626	222,566,400	376,076,026
XII			

Figures are in pounds of fine copper. U. S. production includes all copper refined in this country, both from domestic and imported material. Visible stocks are those reported on the first day of each month, as brought over from the preceding month.

Monthly Average Prices of Metals

SILVER

Month.	New York. 1908.	New York. 1909.	London. 1908.	London. 1909.
January	55.678	51.750	25.738	23.834
February	56.000	51.472	25.855	23.706
March	55.365	50.468	25.570	23.227
April	55.505	51.428	25.133	23.708
May	52.795	52.905	24.377	24.343
June	53.663	52.538	24.760	24.166
July	53.115	51.043	24.514	23.519
August	51.683	51.125	23.858	23.588
September	51.720	51.449	23.877	23.743
October	51.431	50.923	23.725	23.502
November	49.647	.....	22.933	.....
December	48.766	.....	22.493	.....
Total	52.864	.....	24.402	.....

New York, cents per fine ounce; London, pence per standard ounce.

COPPER

	NEW YORK. Electrolytic 1908.	Electrolytic 1909.	Lake. 1908.	Lake. 1909.	LONDON. 1908.	LONDON. 1909.
January	13.726	13.893	13.901	14.280	62.386	57.688
February	12.905	12.949	13.098	13.295	58.786	61.198
March	12.704	12.387	12.875	12.826	58.761	56.231
April	12.743	12.56⅛	12.928	12.93⅞	58.331	57.363
May	12.598	12.893	12.788	13.238	57.387	59.338
June	12.675	13.214	12.877	13.548	57.842	59.627
July	12.702	12.880	12.933	13.363	57.989	58.556
August	13.462	13.007	13.639	13.296	60.500	59.393
September	13.388	12.870	13.600	13.210	60.338	59.021
October	13.354	12.700	13.646	13.030	60.139	57.551
November	14.130	.....	14.386	.....	63.417	.....
December	14.111	.....	14.411	.....	62.943	.....
Year	13.208	.....	13.424	.....	59.902	.....

New York, cents per pound. Electrolytic is for cakes, ingots or wirebars. London, pounds sterling, per long ton, standard copper.

TIN AT NEW YORK

Month.	1908.	1909.	Month.	1908.	1909.
January	27.380	28.060	July	29.207	29.125
February	28.978	28.290	August	29.942	29.966
March	30.577	28.727	September	28.815	30.293
April	31.702	29.445	October	29.444	30.475
May	30.015	29.225	November	30.348	.
June	28.024	29.322	December	29.154	.
			Av. year.	29.465	.

Prices are in cents per pound.

LEAD

Month.	New York. 1909.	St. Louis 1909.	London. 1908.	London. 1909.
January	3.691	4.175	4.025	14.469	13.113
February	3.725	4.018	3.868	14.250	13.313
March	3.838	3.986	3.835	13.975	13.438
April	3.993	4.168	4.051	13.469	13.297
May	4.253	4.287	4.214	12.938	13.225
June	4.466	4.350	4.291	12.600	13.031
July	4.744	4.321	4.188	13.000	12.563
August	4.580	4.363	4.227	13.375	12.475
September	4.515	4.342	4.215	13.125	12.781
October	4.351	4.341	4.215	13.375	13.175
November	4.330	.....	.....	13.538	...
December	4.213	.....	.....	13.166	....
Year	4.200	.....	.....	13.439	.....

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

SPELTER

Month.	New York. 1908.	New York. 1909.	St. Louis. 1908.	St. Louis. 1909.	London. 1908.	London. 1909.
January	4.518	5.141	4.363	4.991	20.563	21.225
February	4.788	4.889	4.638	4.739	20.875	21.563
March	4.665	4.757	4.527	4.607	21.075	21.438
April	4.645	4.965	4.495	4.815	21.344	21.531
May	4.608	5.124	4.458	4.974	19.906	21.975
June	4.543	5.402	4.393	5.252	19.000	22.000
July	4.485	5.402	4.338	5.252	19.031	21.969
August	4.702	5.729	4.556	5.579	19.350	22.125
September	4.769	5.796	4.619	5.646	19.563	22.906
October	4.801	6.199	4.651	6.043	19.750	23.200
November	5.059	.....	4.909	.....	20.875	.
December	5.137	.....	4.987	.....	20.625	...
Year	4.726	.....	4.578	.....	20.163	..

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

STOCK QUOTATIONS

NEW YORK Nov. 17 Name of Comp.	Clg.
Alaska Mine	‡.11
Amalgamated	92⅞
Anaconda	52¼
Balaklala	‡2 1/16
British Col. Cop.	7¼
Buffalo Mines	3½
Butte Coalition	33
Colonial Silver	‡⅝
Cum. Ely Mining	9
Davis-Daly	6¼
Dominion Cop.	7
Douglas Copper	1⅜
El Rayo	2¼
Florence	2⅞
Foster Cobalt	‡.32
Furnace Creek	‡.05
Giroux	11⅝
Gold Hill	1¾
Goldfield Con	7 3/16
Granby	101
Greene Gold	‡⅛
Greene G. & S.	19
Guanajuato	2
Guggen. Exp.	239
Hanapah	‡15
Kerr Lake	8⅛
McKinley-Dar.	.84
Miami Copper	17⅞
Micmac	3/16
Mines Co. of Am.	⅜
Montezu. of C. R.	14
Mont. Sho. C.	1⅝
Nev. Utah M. & S.	1
Newhouse M. & S.	3⅞
Nipissing Mines	10¾
Old Hundred	⅛
Silver Queen	.30
Stewart	1/16
Tennessee Cop'r.	40⅛
Tri-Bullion	1⅛
United Copper	9
Utah Apex	5⅛
Utah Copper	58¾
Yukon Gold	5

‡Last quotation.

BOSTON Nov. 17 Name of Comp.	Clg.
Adventure	5¼
Allouez	58½
Am. Zinc	37½
Arcadian	5
Arizona Com.	45
Atlantic	11⅞
Boston Con.	17
Calumet & Ariz.	103
Calumet & Hecla	675
Centennial	39¾
Copper Range	83½
Daly-West	9¼
East Butte	12¾
Franklin	17¼
Greene—Can.	14
Hancock	15
Isle Royal	26
Keweenaw	3⅛
La Salle	16
Mass	6¾
Michigan	6⅛
Mohawk	63
Nevada	29
North Butte	63⅝
Ojibway	6¾
Old Colony	‡.50
Old Dominion	.55⅛
Osceola	160
Parrot	30¾
Quincy	87
Rhode Island	10⅜
Shannon	16½
Superior	64
Superior & Bost.	14¾
Superior & Pitts.	17⅝
Tamarack	66
Trinity	11¼
U. S. Smg. & Ref	56⅞
U.S.Sm. & Re., pd.	53
Utah Con.	46¾
Victoria	4
Winona	6¼
Wolverine	149
Wyandotte	2⅞

‡Last quotation.

N. Y. INDUSTRIAL Name of Comp.	Clg.
Am. Agri. Chem.	48⅝
Am. Smelt. & Ref.	101⅜
Am.Sm. & Ref., pf.	112¾
Colo. Fuel & Iron.	49
Federal M. & S., pf.	91
National Lead	89
National Lead, pf.	‡110⅛
Pittsburg Coal	25⅛
Republic I. & S.	47¾
Republic I. & S., pf.	105¾
Sloss-Sheffield	91
Standard Oil	‡685
U. S. Steel	90⅛
U. S. Steel, pf.	126⅜
Va. Car. Chem.	49⅞

BOSTON CURB Name of Comp.	Low.
Ahmeek	210
Chemung	15⅞
Chino	83/4
Gila	9⅜
Indiana	7⅛
Mason Valley	1¾
Ray Central	2¾
Ray Con.	23
San Antonio	8
Yuma	1⅝

Furnished by Hornblower & Weeks, N. Y.

ST. LOUIS Nov. 13 N. of Com.	High.	Low.
Adams	.40	.30
Am. Nettie	.09	.07
Center Cr'k	1.80	1.60
Cent.C.&C.	85 00	84.00
C.C. & C. pf.	84.00	83.00
Cent. Oil	105.00	100.00
Columbia	9.00	7.00
Con. Coal	18.00	17 00
Doe Run	115.00	105.00
Gra. Bimet.	28	.26
St. Joe	12.50	11.00

LONDON Nov. 17 Name of Com.	Clg.
Dolores	£1 10s 0d
Stratton's Ind.	0 3 3
Camp Bird	1 7 3
Esperanza	3 0 0
Tomboy	0 18 9
El Oro	1 5 3
Oroville	0 11 3

Cabled through Wm. P. Bonbright & Co., N. Y.

NEVADA STOCKS. Nov. 17.

Furnished by Weir Bros. & Co., New York.

Name of Comp.	Bid.
COMSTOCK STOCKS	
Belcher	80
Best & Belcher	55
Caledonia	.32
Chollar	.22
Comstock	‡.33
Con. Cal. & Va.	80
Crown Point	‡ 98
Exchequer	‡ 43
Gould & Curry	24
Hale & Norcross	35
Mexican	1 17
Ophir	1.35
Overman	42
Potosi	42
Savage	.45
Sierra Nevada	40
Union	49
Utah	.07
Yellow Jacket	93
TONOPAH STOCKS	
Belmont	70
Extension	47
Golden Anchor	...
Jim Butler	11
MacNamara	.27
Midway	13
Montana	75
North Star	‡.02
Tono'h Mine of N.	6.62½
West End Con.	21
GOLDFI'D STOCKS	
Adams	‡.01
Atlanta	10
Blue Bell	.02
Booth	.10
C.O.D. Con.	.06
Columbia Mt.	.06
Comb. Frac.	.44
Cracker Jack	‡.01
Dia'dfield B. B. C.	.01
Florence	2.25
Goldfield Belmont	04
Goldfield Daisy	05
Great Bend	.03
Jumbo Extension	.12
Kendall	‡ 02
Lone Star	‡.02
May Queen	.04
Oro	.02
Red Hill	03
Sandstorm	‡.05

Name of Comp.	Bid.
Silver Pick	08
St. Ives	05
Triangle	‡.01
BULLFROG STOCKS	
Gibraltar	‡ 02
Homestake King.	‡ 01
Mont. Shoshone C.	1 75
Tramp Cons.	.04
MISCELLANEOUS	
Cumberland Ely.	8.81¼
Giroux	11.62½
Greenwa'r Copper	.07
Nevada Con.	28.87½
Nevada Hills	.75
Navada Smelting.	.75
Nevada Wonder.	.60
Nevada-Utah	1.18¾
Penn-Wyoming	...
Pittsburgh S. Pk.	68
Ray Central	2.50
Ray Con.	22.75
Round Mt. Sphinx	‡ 05

COLO. SPRINGS Nov. 17 Name of Comp.	Clg.
Acacia	.07½
C. C. Con.	‡.03
Doctor	.08¾
Elkton	.71
El Paso	.61½
Findlay	.10¾
Gold Dollar	‡.14
Gold Sovereign	.04¼
Isabella	.18
Jack Pot	‡.08½
Jennie Sample	.08
Jerry Johnson	.07½
Lexington	‡.01¾
Mary McKinney.	‡.46½
Old Gold	.04
Pharmacist	.03¼
Portland	.83
U. G. M.	.08
Vindicator	.70
Work	‡.06

Assessments

Company.	Delinq.	Sale.	Amt.
Alpha, Nev	Nov. 11	Dec. 7	$0.05
Arcadian Copper	.....	Mar. 1	0.50
Belcher, Nev	Nov. 9	Nov. 30	0.10
Chollar, Nev	Nov. 8	Dec. 1	0.10
Copper Chief, Utah	Oct. 30	Nov. 22	0.001
Crown Point, Nev	Nov. 30	Dec. 20	0.10
Hancock Min	.....	Feb. 1	1.00
Hypothek, Ida	Sept. 30	Dec. 1	0.005
Marie M. Co., Ida	Oct. 30	Nov. 30	0.002
Mexican, Nev	Dec. 6	Dec. 29	0.10
Missoula Copper, Ida	Oct. 4	Dec. 6	0.01
Overman, Nev	Nov. 9	Nov. 30	0.10
Potosi, Nev	Nov. 12	Dec. 6	0.10
San Antonia Copper, Mex.	Dec. 1	.....	1.00
Savage, Nev	Nov. 10	Dec. 1	0.10
Seven Troughs Mon., Utah	Nov. 22	Dec. 11	0.00½
Sheridan M. & M., Ida	Nov. 20	Dec. 20	0.002
Sonora M. & M., Ida	Nov. 20	Dec. 14	0.002
United Silver-Lead, Ida	Sept. 21	Nov. 20	0.001
Winona, Mich	Dec. 1	Jan. 1	1.00
Yellow Jacket, Nev	Nov. 18	Dec. 22	0.10